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RESULTS OF MINIMUM RATES.

Perhaps the strongest reason advanced for a minimum meter rate in electric-light and power service is that many unused meters would remain indefinitely on the premises of consumers if no such rate were in force, as the consumer would gain nothing by having the meter removed.

There is the additional fact that large numbers of meters show very little consumption in many months, so that the energy used, if charged at the regular rates, with no minimum, may hardly cover the fixed costs per meter to the company.

An illustration along these lines is here presented from the records of a large electrical supply company. This company makes a minimum charge of one dollar per meter per month for electric light or power service, and last year had out about 21,000 meters.

During last October 4,752 customers paid only the minimum rate of one dollar per meter, so that about twenty-two per cent of all the meters were on the minimum basis. For these meters the total recorded energy during the month was 18,185 kilowatt-hours, amounting on an average to 3.8 kilowatt-hours per meter. Out of the total number of meters there were 576, or 2.7 per cent, that recorded no consumption of energy, and these meters that showed no use of the electric current formed 12.1 per cent of all those that paid only the minimum rate.

At the one-dollar minimum charge per meter the 4,752 consumers paid a total of $4,752 during the month. Aside from the minimum rate, the maximum charge of the company for electric energy was twelve cents per kilowatt-hour, and the 18,185 kilowatt-hours recorded by all the meters that paid only the minimum rate of one dollar per month thus amounted to $2,182.20 as a direct energy charge. To this last-named sum, however, the minimum rate required the addition of $2,569.80 to make up the $4,752 actually received. If there had been no minimum rate, the charge of $2,182.20 for energy at twelve cents per kilowatt-hour would have amounted to only forty-six cents per meter.

Even for the 4,176 meters that showed some use of current, the average consumption was less than 4.6 kilowatt-hours, and amounted to fifty-two cents per meter. As the total energy recorded by the 4,176 meters was 4.6 kilowatt-hours each on an average, the use at some of these meters must have been much less than this amount, while at others the energy may have reached 8.33 kilowatt-hours without exceeding the minimum charge of one dollar per meter.

It can hardly be doubted that the number of absolutely idle meters would have much exceeded the 576 actually found, if there had been no minimum charge or meter rent, and it is also probable that the number of meters showing a consumption of energy amounting to less than one dollar at twelve cents per kilowatt-hour, would have been materially greater without the minimum charge in force.

Of course, the costs of reading meters, sending bills, and to a large extent the repairs on meters, are independent of the amount of energy consumed.

AN IMPORTANT DISTRIBUTION AGREEMENT.

There has just been concluded between the Fitchburg Gas and Electric Company and the Connecticut River Transmission Company an agreement of general interest to engineers concerned with the introduction of transmitted power into the central-station field. Frequent reference has been made in these columns to the advance of Connecticut River power into Worcester County along lines destined to be of great economic benefit to the manufacturing communities within commercial radius of the Vernon plant. It has been only natural that the established central-station companies have at first appeared somewhat alarmed at the introduction of this power into fields which they have borne the brunt of developing and maintaining, but through the foresight of the Massachusetts Gas and Electric Light Commission the limitations of each class of service have been well laid down and existing plants protected without discouraging the initiative of those who have labored to bring to this field a cheap supply of power on a large and attractive scale. The appeal of the Fitchburg company on behalf of its small-power business and the limitation by the Commission of sales by the Transmission Company to customers having at least 300 horsepower connected load and an annual consumption of at least 450,000 horsepower-hours are now matters of central-station history. The agreement now entered into by the parties formerly in dispute illustrates, quite apart from the specific terms embodied, the necessity of a thorough handling of such problems by experts in order to avoid overlooking many points of importance which the layman would be unlikely to appreciate.

The Fitchburg company now agrees to distribute power at 6,600 volts to the authorized customers of the Transmission company, and for this service it is to receive a price of five-one-hundredths of a cent per kilowatt-hour measured at the substation of the Connecticut River organization. In general, the bills for this service are to range between twelve and fifteen per cent of the first cost of construction of such 6,600-volt distribution lines as may be needed to reach the 300-horsepower class of customers authorized by the decision of the Commission last summer. The local company is to have nothing to do with the prices charged the large consumers above indicated, but it may compete with the Transmission company for their business without prejudice to the agreement—certainly a broadly conceived feature of the situation, and one which should do much to establish the sharp limits of economical supply from a steam-driven plant on the ground and a water-driven station many miles distant.

Other matters covered by the agreement are the assignment of cost for locations, line construction and maintenance in the distributing district; the right of the Transmission company to scrutinize all bills for such work and to approve the plans and specifications therefor; the bearing of the cost of relocating its substation by the Transmission company; the provision for temporary line construction by the local company and the payment for such work by the hydroelectric organization; an exhaustive definition of the means of energy measurement and billing to be adopted between the companies; provision in case of default of payments; right of each party to have meter tests made; definition of construction costs and consideration of the bearing of future extensions or underground construction upon the distribution investment necessary to handle the waterpower in Fitchburg; responsibility of the local company for the 6,600-volt system, with the exception of service reliability at the customers' premises; responsibility of the Transmission company for the operation of its 66,000-volt lines and substation; provision of bonds, life of the agreement and arrangements for arbitration in case of dispute. Review and modification of the agreement by the Commission under certain circumstances are also provided. Space will not permit a detailed review of these features, but they are cited as indicative of the fact that the making of power agreements is no task for amateurs, but one requiring a combination of technical, executive and legal ability for the most permanently satisfactory results to the contracting parties and the communities which they serve.

THE ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.

The second annual convention of the Association of Car Lighting Engineers, held in Chicago last week, marks the beginning of a new era of progressiveness and usefulness for the association. In only a few cases are the duties of electrical engineers and chief electricians of railroads restricted to car-lighting work, and in fact in many cases this is by no means the most important phase of their activities. As was brought out at the convention, it very often happens that the operation of electrical shop equipment and the installation and maintenance of power stations come directly under their supervision. It will also undoubtedly be true that the men at present employed in the electrical departments of the various railroads will become intimately associated with the problems that are now uppermost in the minds of the railway officials—namely, the electrification of steam railroads.

Accordingly, the action of the association in broadening its apparent scope and in changing its name to that of the Association of Railway Electrical Engineers was indeed a wise measure. Its membership will include electrical engineers who have heretofore considered themselves ineligible as members of

the association on account of not being directly interested in car lighting. Thus, the strength and influence of the association will be materially increased.

In the matter of car lighting, which will continue to occupy much of the association's time, it will be well for it to cooperate with the Illuminating Engineering Society, for in much of the train and depot lighting in vogue there has been but a poor application of the principles of illuminating engineering. Heretofore the generation and regulation of the lighting current has engrossed the attention of the car-lighting engineers; it is time that the resulting illumination be considered. In the matter of the electrical propulsion of trains it would be well for the new association to confer freely with the American Street and Interurban Railway Engineering Association. The convention of the latter, just held in Denver, shows that the electric railways, particularly the interurbans, are adopting very extensively the practice of the large trunk railroads of the country. When the latter are to take up electrification it will be well for them to study the work that has been done on electric railway systems. It will be well, also, for the new association to co-operate in general with the American Institute of Electrical Engineers on such electrical topics as do not come specifically in the sphere of the other associations that have been mentioned.

THE ELECTRIC RAILWAY CONVENTIONS.

From every point of view the conventions of the American Street and Interurban Railway Association and its affiliated associations held in Denver, Colo., all last week were entirely successful and thoroughly enjoyable. The determination to concentrate attention upon a discussion of the reports of the standing committees, or upon papers tributary to these reports, was not only a fine acknowledgment of the services of the committeemen, but indicated the true line along which progress can be made.

All of the sessions of the various associations were well attended and the discussion maintained enthusiastically. The ardent discussion of such matters as interurban rules, equipment, standards, and materials, with in many cases a referring back to the committee showed clearly the interest with which these matters are being watched. Long discussion may defer adoption, but the air is clearing all the time, and much progress may be looked for soon.

As for the entertainment features, they were so numerous and diversified that there was something for someone all the time. The Denver committee on entertainment may well feel proud of its hospitality.

The exhibition of electric railway apparatus presented by the Manufacturers' Association was in keeping with the magnitude of the industry and the importance of the meeting. The exhibition arrangements were skillfully handled, and the visiting delegates well repaid for their attention to this very important feature of the convention work.

HANDLING RIGHT-OF-WAY PROBLEMS.

In the establishment of a power transmission line the problem of securing a suitable right-of-way after the engineers have indicated its generally desirable course is one of the most important and interesting matters that arise. A peculiar ability is needed to deal properly with a right-of-way situation. It calls for no very deep knowledge of impedance and capacity, but for a combination of engineering judgment and tact which need not be despised by those of high technical attainments. A recent trip over the route of a forty-mile transmission line with the engineer who negotiated the right-of-way proved to be an eye-opener, as the saying goes, as to the importance of this work.

The fundamental point to insure in right-of-way bargaining is the minimum possible investment to establish a permanently reliable route. It is easy for an inexperienced man to overlook the fact that interest and taxes must be paid upon the line from one end to the other, and that every dollar expended for the right-of-way or for additional construction safeguards required by alterations of route lays its yearly burden of interest and taxation upon the earning system. Prompt action is therefore most desirable when favorable terms are broached to or by owners of property along the route, and the sooner settlements can be made the better, generally speaking. The amount of money which has to be paid for easements will naturally vary through the widest limits. On the line in question an average price for a perpetual pole location was about $1.50. This price gave the company a signed statement releasing it from any further payments on account of the pole location, and was unusually reasonable; but in this case the line was built to supply power to the substations of a long interurban railway which provided a district with transportation facilities that almost revolutionized the life of each community traversed. There was a generally favorable sentiment toward the construction of the railway.

On the above line the most difficult negotiations were in connection with the removal or cutting of trees, and in some instances, as consent could not be obtained to trim, it was necessary to cross the highway and pass by on the other side. This proved to be the best course in several instances where the trees could not be removed, for as the line was built to carry 33,000 volts, no chances could be taken of tree branches coming in contact with the circuits. In some cases a cash settlement sufficed for trees, in others the farmers required the company to cut them down and saw them into cord wood—a process which was rather expensive in labor and time. Practically every mile of the route exhibited special situations and comparison of the different solutions was difficult. For this reason the company doubtless saved money by prompt action, for the strong neighborly spirit of the rural districts passes along the word very quickly that the right-of-way man is on the trail of the farmer, and it is only natural for Smith to expect $15 for the right to cross his pasture if the same amount has been paid to Doe, although the engineering situation in one case may be entirely different from that in the other.

Distinguished British Telegraph and Telephone Official Visits Chicago.

Major Walter O'Meara, late of the Royal Engineers, now chief engineer of the British post office department, in company with J. F. Preston of the same department, has been in Chicago the last week gaining pointers on American telephone methods in particular, and also in general on American telegraph business. In 1911 the British Government will take over the entire telephone system of the British Isles. Within the last two weeks the wireless system of telegraphy has been acquired from the Marconi Company by the government.

Major O'Meara has been interviewing Bernard E. Sunny, president of the Chicago Telephone Company, Postmaster Campbell, and a number of leading officials interested in the telephone and telegraph business in Chicago. His itinerary takes him to Grand Rapids, Omaha, St. Louis and back to Chicago, then again to New York.

The major, a typical officer of the most distinguished corps in the British army, is a man of fine appearance, with ability, in his particular line, well recognized the world over. He served with distinction in Burma; was mentioned in the dispatches, received medals and clasps, and was chief officer of the intelligence department during the siege of Kimberly in the Boer war. Later he was chief intelligence officer at Bloemfontein, and head of the Orange River Colony mounted police. Major O'Meara received the official thanks of the British Postmaster-General for his services in installing the telephone service between France and England. He has a record for executive ability and practical experience in electrical affairs in their relation to telephone and telegraph matters.

Mr. Insull to Speak Before Chicago Electric Club.

At the regular meeting of the Chicago Electric Club, to be held in the rooms of the Chicago Automobile Club, on Wednesday noon, October 20, Samuel Insull, president of the Commonwealth Edison Company, will address the club. Mr. Insull's subject is announced to be "The Sale and Distribution of Electrical Energy in Chicago."

Chicago Street-Car Casualities.

An average of eleven persons have been injured daily and one person killed every other day for the last three months by the Chicago street cars.

Luncheon of Denver Members to the Secretary of the American Institute of Electrical Engineers.

The Denver members of the American Institute of Electrical Engineers under the leadership of Dr. W. E. Goldsborough, tendered a luncheon to Ralph W. Pope, secretary of the American Institute of Electrical Engineers, at the Brown Palace Hotel, Denver, Colo., Thursday, October 7. Mr. Pope has been making an extensive trip throughout the western states, meeting the members of the Institute in connection with the formation and development of geographical sections of the Institute. At Portland, Ore., Seattle, Wash., San Francisco, Los Angeles, Palo Alto and Visalia, Cal., Mr. Pope has met with the local members of the Institute and created great enthusiasm for the organization and strengthening of the local sections.

He was en route to Kansas City, when he stopped off at Denver to look in at the meeting of the Street Railway Associations and look over the exhibits of the Manufacturers' Association. Under the leadership of Dr. Goldsborough, a very enjoyable party was arranged, and about forty members and guests greeted Mr. Pope and felicitated with him upon the great work this Institute was doing and the wisdom of President Stillwell's course in so actively taking up this branch of the work. Dr. Goldsborough acted as chairman, and in introducing the guest of honor paid a high tribute to the quality of the men and the work which the Institute represented in Denver.

Mr. Pope responded briefly and gracefully and was followed by Charles Hewitt, of Philadelphia, J. F. Dostal, of Denver, O. B. Coldwell, of Portland, and James H. McGraw, of New York.

New Telephone and Telegraph Concern.

The Continental Telegraph and Telephone Company has been incorporated at Trenton, N. J., with $50,000,000 capital. The company will be a holding concern "to unite and consilidate any telegraph, telephone or cable lines and systems into one system," and may send messages "with or without wires." The incorporators are W. M. Clark, of Plainfield; Powell Crichton and William E. Conley, of New York, who are connected with Philbin, Beekman & Menken, the attorneys for the interests behind the company. The Continental is said to have nothing in common with the American Telephone and Telegraph Company.

Industrial Exposition in Buffalo.

The city of Buffalo, beginning last week, has been presenting the various industries of that city in a large exhibition hall. The electric illumination is particularly attractive, and a number of arches and special illumination designs calling attention to the exhibition hall are to be seen on the streets.

The Buffalo General Electric Company has a very complete exhibit of household electric appliances. The parlor, heated by an electric grate, bedroom, dining-room, kitchen and laundry supplied with various devices needed, are shown and attract a great deal of interest. Wm Huntley, assistant general manager of the Buffalo General Electric Company, takes a special interest in this exhibit, which is one of much credit to his company.

Among other exhibits are the Babcock Electric Carriage Company, showing a number of Babcock electric automobles; Tabor Pump Company, exhibiting the Tabor vacuum cleaning machine; the Wegner Machine Company, builders of the Wegner refrigerating machine; Foster & Lynn Engineering Company, exhibiting the Keystone vacuum cleaning system; and the Buffalo Copper and Brass Rolling Mill, exhibiting a fine display of sheet and roll copper of various sizes.

The exhibition is very largely attended and will continue through the present week.

Franklin Institute.

The section meeting of Franklin Institute, Philadelphia, that was held on the evening of October 7, was addressed by Prof. Edward H. Landis, of the Philadelphia Central High School, on the subject, "Some of the Laws Concerning Voltaic Cells." For the meeting of October 14 Charles A. Barton, of the Nernst Lamp Company, was scheduled to give an illustrated lecture on "Recent Improvements in the Design of Nernst Lamps."

Steam and Electric Traction on the Same Tracks.

Steam and electric traction on the same tracks has been in operation on the Colorado & Southern Railway for about twenty-six miles out of Denver, since May, 1908. No difficulty has been experienced in the operation of trains, and it has not been found that smoke or steam has in any way damaged the overhead construction. The electric cars operate a suburban and interurban service auxiliary to the steam-train service.

An Electrically Equipped Stone Quarry.

Near Gary, Ill., about eighteen miles southwest of Chicago, is located the new stone-crushing plant of the Dolese & Shepard Company, which has recently been put in operation. This plant, which is believed to be the most complete of its kind, replaces one which was destroyed by fire in April, 1908, on approximately the same site. Its design is based upon the most modern practice in equipment and operation. The plant is located on the Chicago, Illinois & Western Railroad, which enables the Dolese & Shepard Company to make deliveries with its own locomotives direct to Chicago, and connection is also provided with the Indiana Harbor Railroad, which is an outer belt road extending to the steel plants around the southern end of Lake Michigan. These plants use an immense quantity of limestone for flux in blast-furnace operation.

The Dolese & Shepard Company owns at the site a tract of land covering about 350 acres, 135 acres of which are available for quarrying purposes. It is believed that stone can be taken out to a depth of 250 feet under the 135 acres available, but at present it has been excavated to a depth of only forty feet from the surface, covering an area of about eleven acres, so that stone will be available at this quarry for years to come. The stone, so far, has been found quite uniform in character and has only a slight overlay of earth. It is quarried readily and can be handled and crushed in a very satisfactory manner with the present equipment. The output of this plant varies in size from particles which pass through a screen with 100 meshes to the square inch to stones four inches in size. The former are used as a substitute for sand, the latter shipped directly to the steel works for use as flux in blast furnaces.

VIEW OF QUARRY TRACK, SHOWING THIRD RAIL.

GENERAL VIEW OF QUARRY AND BUILDINGS, SHOWING ELECTRIC SHOVEL AND CENTRAL CONTROL TOWER.

The crushing plant includes seven main buildings, located in a row, and constructed of concrete and structural steel. This material is used on account of the heavy loads to be carried. The quarry from which the stone is mined is located directly north of the plant. Starting at this point the first building in the row is the substation. The other buildings in the order in which they are located may be designated as follows: The receiving crusher building; the No. 9 and the No. 6 buildings; the main screening building, and the recrushing building. The output of the quarry is delivered to the receiving crusher building, and then is passed continuously through the remaining buildings to the loading point for shipment.

The entire mechanical equipment of this plant is driven by electricity. All large machines are driven by individual motors, and the smaller machines are group-driven from line shafts belted to motors.

Power is purchased from the Economy Light and Power Company, of Joliet, Ill. In addition to the feeder from this company, there is also a circuit connecting the plant with the Fisk Street station of the Commonwealth Edison Company, of Chicago, so that in case of a breakdown on the Joliet line power may be received from Chicago.

Sixty-cycle three-phase current is received at a pressure of 33,000 volts at the substation of the plant and is passed through two 750-kilowatt Westinghouse step-down transformers, which reduce the pressure to 440 volts for local distribution.

The power and substation building, fifty by 150 feet in plan, has walls of hollow concrete blocks and is covered with a sheet-iron roof. All electric power and lighting circuits throughout the plant are controlled from a twenty-three-panel Western Electric switchboard in this building. Each section of the plant is supplied from a separate panel on which are mounted integrating wattmeters of Sangamo and Westinghouse make, that keep a continual check on the amount of power consumed by the different sections. The switchboard is also equipped with Wagner ammeters and voltmeters and Cutter circuit-breakers.

Current is delivered from the substation to the different buildings in three-conductor lead-covered cables placed in vitrified ducts laid underground the full length of the crushing plant. Manholes are placed at each section of the latter, so that branch connections may be made to distributing cabinets within the building. From these cabinets a separate supply feeder delivers power to each motor.

The plant is lighted throughout by arc and incandescent lamps, the current for lighting being stepped down by transformers in each building from 440 to 120 volts. Arc lamps are provided about the grounds and in the quarry, in order that operations may be carried on at night. These lamps are supplied with current direct from the substation and are entirely separate from the lighting circuits within the buildings.

The first process in the operation of the plant is to loosen the stone around the quarry. This is accomplished by drilling holes in the rock by means of automatic-feed Ingersoll-Rand rock drills mounted on rectangular frames, and arranged to be moved as a unit. The drills are operated by compressed-air motors mounted on the frame. The air is furnished by two two-stage Ingersoll-Rand compressors installed in the substation. These two compressors each have a capacity of 2,200 cubic feet of free air per minute delivered at a pressure of eighty pounds. Each compressor is belted to a 300-horsepower induction motor. These compressors deliver to a receiver tank located in the substation, from which a supply pipe is laid on the surface in a loop extending entirely around the edge of the quarry. This pipe line is arranged in sections and provided with necessary valves, so that branch lines may be extended to points where drilling operations are in progress.

Stone loosened by the process of drilling and dynamiting is loaded into cars by electrically operated power shovels, built by the Vulcan Shovel Company, of Toledo, Ohio, and operated by Westinghouse motors. A description of these shovels appeared in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, on page 260, in the issue of August 7, 1909.

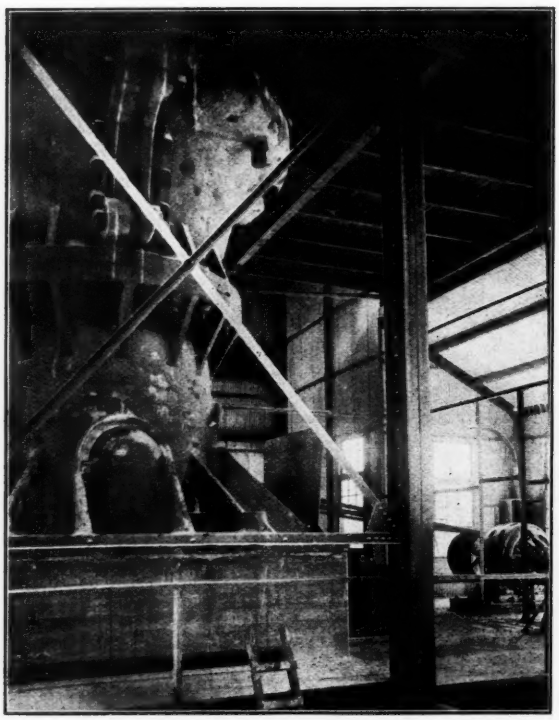
For conveying stone from the quarry to the receiving crusher building an electric traction system is installed, operated on the Woodford system of central control, which is one of the most important and interesting features of the entire installation. This is an industrial haulage system, consisting of electrically driven cars operated from an ordinary track and controlled from a central point.

At the plant of the Dolese & Shepard Company a double track of standard gauge is laid on the quarry bed, extending around its entire periphery and having cross-over tracks at intervals. The inner track, or that farthest from the sides of the quarry, is considered the main track, and the other the loading track. At the end of the quarry nearest the crushing plant a track leading off from the main one leaves the lower level and extends up a six per cent grade to the surface, where it turns to the right on a three per cent grade and extends further up a six per cent grade and on a steel trestle to the crushing plant. The total elevation above the lower level of the present quarry is about eighty feet. On its approach to the crushing plant the track divides, a branch running on each side of the crusher and uniting again into one track on the opposite side of the plant, extending down an eight per cent grade, curving to the right and connecting with the main track at the lower level. The track on the incline to the crusher and back forms half of a figure eight, the other half being completed by a track on the lower level, the one on the six per cent grade crossing that on the eight per cent grade, making the entire track circuit free for a continuous cycle of operations.

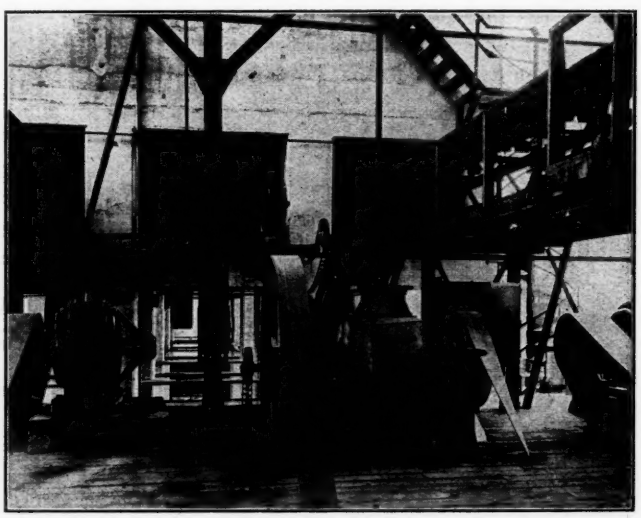
The cars of this system for handling the stone are of the side-dump type, of ten yards capacity each, built entirely of steel, except the box, which is steel-lined. Each car is equipped with two thirty-horsepower street-railway motors and also with an automatic controlling mechanism for this system of control. Each car is also equipped with an electric brake under the control of the central operator. Included in the automatic controlling mechanism on the cars is a selective relay, which, upon the forward movement of the controlling lever in the tower, places itself in such a position as to close the motor circuit. Upon the opposite movement of the lever this relay closes the brake circuit, causing the brakes to operate.

Electric current is conducted to the motors and controlling mechanism by means of a third rail, divided into sections, which is mounted between the track rails. This location of the third rail is particularly adapted for tracks which are necessarily portable.

The controlling tower from which all of the cars in the system are manipulated is located near the crusher and in sight of a large portion of the quarry bed, where the circuit of main and loading tracks is located. From this tower each car may be operated independently from any of the others. It is possible to start it in either direction or to stop it with a brake upon any portion of the



Motor-Driven Mammoth Stone Crusher.

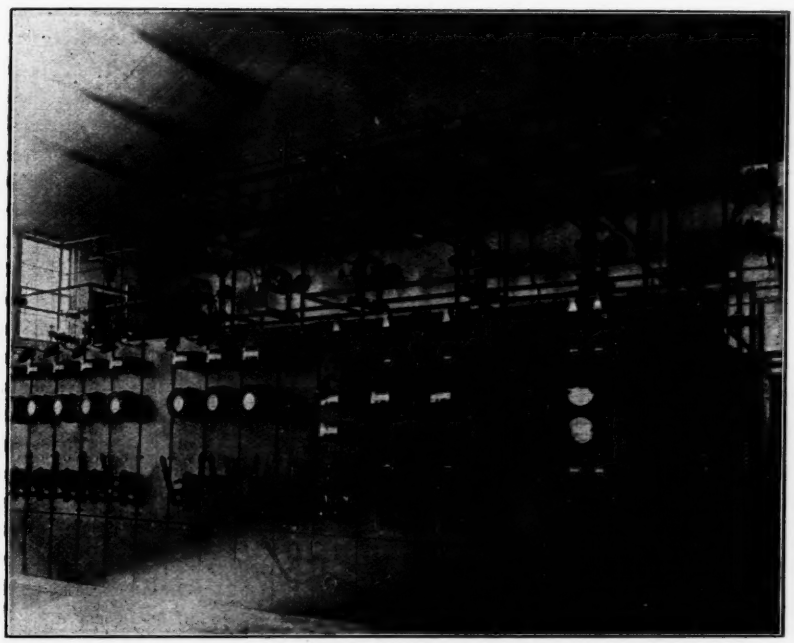


Motor-Driven Conveyors.

APPLICATIONS OF MOTOR DRIVE IN A STONE QUARRY.

system of tracks over which it is being operated. The switches of the cross-over tracks are operated from the controlling tower, so that the operator may dispose of the car on either the main track or the loading track at will.

Each of the electrically operated shovels is equipped with an auxiliary controller for a part of this central control system with which the shovel operator manipulates the cars which are to be loaded on the loading track, and moves them forward after loading, to a position so as to be taken by the tower control. In this position the loaded car operates a signal in the tower indicating on which loading track the car is loaded and ready to be taken up. In this position the car



VIEW OF SWITCHBOARD IN SUBSTATION—DOLESE & SHEPARD COMPANY'S STONE QUARRY.

can be moved by neither the shovel man nor the tower operator unless the main track at this point or at this cross-over track is cleared.

After the car is loaded it is unnecessary for the operator to pay any attention to it on its trip out of the quarry, up the grade, and to that portion of the track approaching the crusher, as it here runs on a level track through the building and stops without his attention.

The section of the track in the crusher building is under the control of the operator stationed in the latter. When a load is needed at the crusher it is brought forward by this operator, electrically dumped and started on the downward trip.

The speed of each car on this downward trip from the crusher to the quarry is governed automatically. As each car approaches the downward grade it comes in contact with a stationary trip which automatically operates a lever extending out from the side of the car. This lever operates a switch which changes the connection, causing the motor to operate as a generator. The current thus generated passes through a resistance mounted on the car, which limits the speed. It may be seen that this speed can either be increased or decreased, according to the amount of resistance inserted.

The level portion of the track leading to the crusher and which divides into two branches extending on each side of it, has a capacity for a number of loaded cars. As these loads may be kept close together, and with the opportunity to dump them on each side of the crusher, it will be seen that the amount of raw material that can be delivered to the crusher is limited only by the number of cars in operation and the facilities for loading them.

The control of the cars is resolved into starting them from the shovels, and bringing them forward at the crusher to be dumped, and starting them upon their downward trip. While in an emergency the car may be started or stopped upon any portion of the track, the operation of each car is continuous and does not require the attention of the operator except at the terminals. A car loaded at any of the shovels will be 1,000 feet or more on its way by the time the next car is loaded at the same shovel, making it possible for empty cars and loaded cars to be operated along the main track and distributed to and from the different shovels as they are needed.

An automatic scale is installed along the route of the loaded car track which weighs each load as it passes over. Each car, by a non-interfering signaling device, indicates at the scale by which shovel the car being weighed was loaded. The weight of the load and the number of the shovel loading it is automatically marked on the tape at the same time. The tonnage of each shovel for the day may in this way be recorded at the scale.

Direct current at a pressure of 250 volts for the operation of the car and track system is furnished by two 200-kilowatt motor-generator sets. Motor-generator sets of the same capacity furnish current for the electrically operated shovels, and the switchboard is so arranged that any of the generating units may be made to supply current for either shovels or the haulage system.

The receiving crusher to which the quarry cars deliver in the first building is of the McCully gyratory type with receiving openings forty-two inches in width. This crusher is called the "Mammoth," as it is believed to be the largest of any type that has been built to date and breaks the stone to a size of eight inches and under. Its approximate weight is 213 tons, and it has an estimated capacity of 800 cubic yards of stone per hour. For operating, it is connected by means of a steel rope drive to a 250-horsepower induction motor.

This crusher has two discharge openings, one on each side, which deliver stone into pan conveyors fifty-four inches wide. These conveyors extend up into the top of the No. 9 crusher building at an angle of forty-five degrees. Each conveyor is driven at the upper end through gearing by means of a seventy-five-horsepower induction motor.

These conveyors both discharge at the top into two No. 9 gyratory crushers, which are each belt-driven by an individual 100-horsepower induction motor. The stone is reduced in these crushers to pieces having a maximum size of four inches, and is discharged through each crusher into two forty-eight-inch by twenty-four-foot revolving screens, having two-and-one-half-inch perforations. The stone passing each of these four screens drops into a hopper supplying a

twenty-four-inch horizontal belt conveyor. These four conveyors are placed in concrete-lined trenches and extend from this building to and through the adjoining No. 6 crusher building, where they discharge the stone at the bases of four thirty-inch belt conveyors leading to the main screening plant. The oversize from each of the screens to which the output of the No. 9 crushers also is delivered falls into a forty-eight-inch pan conveyor similar to the one in the receiving crusher building, which elevates the stone from these screens at an angle of forty-five degrees and discharges it into storage bins of the No. 6 crusher building.

In buildings on each side of these bins there are installed four No. 6 gyratory crushers, which reduce this stone to about three inches in size and discharge it into twenty-four-inch belt conveyors that extend from the No. 9 building to the thirty-inch conveyors leading to the main screening plant. These crushers are operated by fifty-horsepower induction motors.

Four thirty-inch belt conveyors, gear-driven by sixty-horsepower induction motors, convey stone to the main screen building, where it is discharged in the revolving screens. The stone is here distributed, according to size, to the main storage bins.

The recrushing plant is equipped to reduce the size of any stone, suitable conveyors and crushers being provided. All the crushers and conveying machinery are driven by individual motors.

It is estimated that when the plant is working at its full capacity the total horsepower used will exceed 2,000.

The forty-two-inch gyratory crusher, pan conveyors, screens and crushing rolls were supplied by the Power and Mining Machinery Company, of Cudahy, Wis. The No. 9 and No. 6 Gates gyratory crushers, the motor-generator sets and the motors for the quarry cars were furnished by the Allis-Chalmers Company, of Milwaukee, Wis. All induction motors throughout the plant were furnished by the General Electric Company, Schenectady, N. Y. The belt-conveyor mechanisms were supplied by the Webster Manufacturing Company, of Chicago, Ill., and the Stephens-Adamson Company, of Aurora, Ill. The steel chutes and hoppers throughout the plant were supplied and erected by the Hamler Boiler Works, of Chicago. The traveling cranes, jib cranes, trolleys and chain blocks were furnished by the Whiting Foundry and Machine Company, of Chicago. F. E. Woodford, of the Woodford Engineering Company, of Chicago, designed and supervised the installation of the quarry traction system.

George W. Patnoe, general superintendent of the Dolese & Shepard Company, has been directly in charge of this plant during its construction and is credited with a number of inventions which add to the completeness of its equipment.

An Electric Recorder for Mine Cages.

A mining engineer in South Africa has recently constructed a device for automatically registering signals given in the shaft and in the engine room as well as the travel of the skip or cage. The records are obtained by means of a specially constructed clock, between the face of which and the mechanism is fixed a cylinder about six inches in length by two inches in diameter. A paper band, sectioned into time spaces, is placed over the cylinder, and a small disk recorder with a separate needle attachment is adjusted in close proximity to one side of the cylinder. The disk and needle are both operated electrically, but separately. The disk, which records the cage journeys, is brought into contact with the sectional paper on the cylinder by means of a small motor driven from the winding drum, marking a line on traveling paper as long as the drum is in motion. When the drum ceases to revolve the contact is cut off automatically and the disk is raised from the paper, which continues to travel without being marked until the drum commences to revolve anew, when the process is repeated. The signal registrations are attained by means of a separate wire connected with the signal bell. Immediately a signal is given, the needle is simultaneously projected upon the traveling cylinder barrel and perforates the paper, the perforation being repeated each time the bell is rung. The time sectional paper thus records each and every signal given, and the times at which they occurred. The clock and registering apparatus is enclosed in a glass case which permits observation of the movements to be made when desired. A separate instrument is, of course, required for each engine. The machine need not necessarily be placed in the engine room, but in any place which may be deemed convenient, such as the engineer's or manager's office; it is only a matter of wire connection.—*Abstracted from the Engineering and Mining Journal, July 24.*

Distribution of Electrical Energy by Farmers' Co-operative Societies.

Many agricultural establishments are not of sufficient importance to warrant the installation of a private electric generating plant, and waterpowers which might furnish cheap motive power are not always present. In order to permit such establishments to profit by the advantages which the application of electricity to farming operations and illumination offers, several co-operative societies have been formed by farmers for producing and distributing electrical energy to their customers, which may include other persons than members of the association, and in such case the society may derive a profit from the sale of current. But the consumers may also be limited to the persons founding the co-operative society, and if it makes no profit from its installation, it may receive aid from the Minister of Agriculture and particularly from the Bureau of Agricultural Improvement. This Bureau has attempted to show what benefits may be gained by a co-operative society, and has started and subsidized a company of this kind, the Société de Maison Neuve, which utilizes a fall of the Oise and distributes the electrical energy produced among its members at such a price that no profit remains, except for the establishment of a reserve fund. For lighting, current is sold under contract or by meter, and for power purposes by meter only. The price for light is sixteen francs a year per sixteen-candle-power lamp, and 0.18 franc per kilowatt-hour for motive power. According to M. Petit, who has recently issued a book from which this information is taken, the installation operates in a perfectly satisfactory manner, and the selling prices are considerably lower than those of commercial stations in that region.—*Translated and abstracted from La Revue Electrique (Paris), August 30.*

Cable Company Work Stopped.

The work of the Commercial Cable Company at St. Johns, Newfoundland, in putting in underground conduits in the streets of St. Johns, in order to connect its city office with the place of landing of its cable, has been stopped by the Newfoundland authorities. This makes it necessary for the cable company to operate its cable in a hut on the seashore in a wild and desolate location. The cable company has decided to ask the American Government to intervene.

A Hydroelectric Plant in Nyassaland.

One of the selected papers printed by the Institution of Civil Engineers is an interesting account by A. S. Chalmers of a hydroelectric installation which he put up on the Shiré River in Nyassaland. The Shiré is now only intermittently navigable, railway construction is making slow progress, and transport by native carriers is expensive. Minerals are plentiful, chiefly hematite and magnetite, with occasional seams of coal, but the country's development seems to lie mainly in agriculture. One or two small townships have sprung up, as Blantyre and Zomba, the engineering needs of these being supplied chiefly by a small electric lighting plant driven by a Pelton wheel, which has not proved very reliable. At Livingstonia, at the north end of Lake Nyassa, there is a considerable white population, mostly engaged in the education and the industrial training of natives, and there has arisen a need for the employment of a considerable quantity of machinery for woodworking, printing and milling, to take the place of what, though cheap, is not very efficient native labor. Oil engines with petroleum at $1.75 per gallon were out of the question, and the installation of a steam plant would have necessitated the introduction of an unwieldy boiler. As waterpower was available, it was decided to lay down turbines, and to have them of such simple construction that skilled native labor could be requisitioned to superintend the installation when once it was erected. The main points which had to be considered were, first, that at times both lighting and power would be required simultaneously; and secondly, that the center of distribution would be two-and-one-half miles from the supply station. As to the first point, storage batteries for equalizing the load were unsuitable, being too expensive, so it was decided to generate the power as required. The choice lay between a three-phase high-tension system and a direct-current supply. The cost of overhead lines precluding the latter, the installation of three-phase units generating current at a pressure of 2,000 volts was decided upon. There was a supply of water, said to be thirty cubic feet per second, with an available fall of more than 100 feet. It was under these conditions that in 1901 Mr. Chalmers undertook the design and erection of the plant. It consisted of the following: Two thirty-horsepower reaction turbines and generators; one high-tension motor of twenty-five brake-horsepower; six step-down transformers with outputs ranging from four to seventeen kilovolt-amperes; low-tension motors, two of ten horsepower, one of five horsepower, and one of two-and-one-half horsepower; and 500 sixteen-candlepower incandescent lamps. The plant equipment was of Swiss manufacture.

Erecting the plant in such a remote place proved to be more difficult than was anticipated. There were two porterages of fifty and seventy miles, respectively, on the route, and a timber-pile jetty 700 feet long had to be constructed out into the lake to effect a safe landing of the machinery. The site lay 2,500 feet above lake level, and after several unsuccessful efforts to sledge the machinery up the hillside the attempt was abandoned, and the construction of a road eleven miles long was begun. The road occupied the greater part of two years in construction, and cost over $20,000. Directly the road was through the machinery was brought up in ox wagons. Owing to repeated outbreaks of dysentery in the settlement from contamination of the water supply, all work in connection with the electrical installation was stopped until a new supply could be brought from the hills. This involved the laying of eight miles of steel pipes, from four inches to one inch in diameter. In 1904, a start was made with the electrical scheme. A dam was formed across the stream by two rows of piles four feet apart and a filling of clay puddle; the face was battered with nine-inch courses of sharp gravel, sand and clay to a height of twelve feet. The water, which actually amounted to only nine cubic feet per second in the dry season, was led in a brick lade for 400 yards to a settling pond of 10,000 cubic feet capacity, and thence by a fourteen-inch pipe 490 feet long to the turbines. The hydraulic plant consists of two thirty-horsepower inward-flow reaction turbines with horizontal axes, running at a speed of 1,000 revolutions per minute.

As to the electrical plant, there are two 23.5-kilowatt generators supplying current at a pressure of 2,000 volts. The generators are of the usual type with rotary magnets and direct-coupled exciters. The windings are delta-connected, as the voltage reaction produced by uneven loading of the phases is much smaller for this than for the star connection, unless the increased expense of a fourth neutral wire is incurred. A voltage variation of ten per cent up or down is obtainable through a resistance, but owing to the reliability of the governor this is very seldom altered. The installation of equal units has resulted in a considerable saving in spares, besides facilitating the running of the two machines in parallel. The switchboard consists of three panels, one for each machine, the current being combined for distribution on the third. The connections are behind the metal framework and so out of reach of the native operators. The machine panels each carry a low-tension voltmeter connected through a three-point switch to a potential transformer. There is also an ammeter, a phase lamp, and a three-pole high-tension switch. These are fixed on the third panel, one high-tension voltmeter with a six-point switch, three ammeters and a three-pole high-tension switch.

Concerning the overhead lines, these consist of three No. 8 Standard Wire Gauge, hard-drawn, copper wires, which were carried on Buller steel poles fourteen feet above the ground. Horn-type arresters at both ends and middle protect the high-tension lines from lightning, and the secondary lines where overhead are protected by low-tension arresters of the zinc-plate spare-gap type.

The scheme of distribution is arranged in sections as follows:—Section 1, at a distance of 100 yards from the power house: One twenty-five-horsepower high-tension motor, driving a saw mill and a plastic brick-making plant. Section 2, at one-and-one-half miles: One three-phase step-down transformer (oil cooled) ten kilovolt-amperes, with a star-connected secondary at 190 volts pressure, driving a ten-horsepower motor for a flour mill and a threshing mill. A pressure of 110 volts for lighting is obtained between a fourth neutral wire and phase 3. Section 3, at two-and-one-fourth miles: One single-phase seven kilovolt-ampere transformer on phase 1, for lighting only. Section 4 at two-and-one-half miles: One seventeen-kilovolt-ampere three-phase transformer, star-connected to feed three motors at 190 volts. The motors are of ten, five and two-and-one-half horsepower, being used for woodworking, engineering and printing shops, respectively. Section 5: One single-phase transformer of seven kilovolt-amperes for lighting only, on phase 2, secondary 115 volts. Section 6, at three miles: One single-phase transformer of four kilovolt-amperes for lighting only, on phase 1, secondary 115 volts. Section 7, at three-and-one-fourth miles: One seven-kilovolt-ampere transformer, the same as on section 5 and on phase 2. Section 8,

at three-and-one-half miles: One seven-kilovolt-ampere transformer, the same as last, but on phase 3.

The only trouble experienced with the plant was in connection with the thrust-bearings on the turbines. These have now been replaced by experimental bearings; one is a Hoffmann double-thrust ball-bearing; the other, designed by Mr. Chalmers, is a hydrostatic bearing, which automatically adjusts itself to the working pressure. A pipe was brought to the rear of the bearing direct from the main fourteen-inch pipe, and the pressure of the water thus comes on to the diaphragm fixed to the shaft. If the pressure should tend to be too great for the thrust, the shaft travels endwise to a small extent and so produces a greater opening to exhaust and establishes equilibrium. This bearing, if rather cumbrous on such a small plant, should be very effective on plants working under a much higher fall. For two years the plant has been in operation on an average of 120 hours a week and without a single stoppage for repairs. —*From the Electrical Engineer (London), September 17.*

Putting Electric Wires Underground.

There seems to be a general activity all over the country in an endeavor to do away with overhead wiring. Among the cities which are foremost in their efforts in this direction are Baltimore, Md., and Malden, Mass.

In the former town Subway Engineer Phelps reports that more than two-thirds of the total mileage of subways contemplated has already been constructed, and that it is expected to have the entire system finished in about two years. To put underground all of the overhead wires in the city requires the laying of about 166 miles of conduits, and of this 111 miles has been laid. Of the $1,000,000 conduit loan, Engineer Phelps spent last year about $219,000.

In Malden work has already been begun by the Malden Electric Company in putting its wires underground. By agreement with the city the company was to begin this year. The cost of the work in Malden to care for all the main trunk lines will be $300,000, and it is to be done in seven years. In the first three years the company will expend $100,000, and from then until the work is completed $50,000 each year. The work is being done under the direction of Electrician F. C. Sergent, and the contractor is G. M. Gest, of New York.

Electricity in the Hospital.

Not unnaturally, the majority of medical men in the United Kingdom are turning their attention to St. Bartholomew's Hospital, says *The Electrical Engineer,* of London, Eng., for the electrical department there has recently been enriched by the introduction of a Von Lepel generator. It is the first, so far, put into use over there, and is intended to cure rheumatoid arthritis and other diseases of the articulations. By means of a transformer a current of low frequency is stepped up to a sinusoidal current of high frequency. The electrodes consist of copper disks, which are brought into contact with the bare skin at the desired points. The current is controlled by means of a pedal arrangement, the operator thus having his hands free and being able to watch both patient and ammeter. Under the control of Dr. Lewis Jones, the Von Lepel instrument is already giving promise of success in rheumatoid cases, and is being tried in the treatment of paralysis. The instrument and treatment are too new for one to venture the prophecy that these appliances will become part of the obligatory equipment of every hospital and surgery, but, if Continental experience is confirmed in England, it will only be a question of time. Once more the electrician will have conferred an immense boon on humanity.

Turbines for American Battleships.

Both the new American "Dreadnoughts," of 26,000 tons displacement, for which contracts were recently awarded, are to be equipped with Parsons turbine engines.

This decision was reached at a conference in Washington, D. C., between Secretary Meyer, Commander Cone, Chief of the Bureau of Steam Engineering, and Rear Admiral W. L. Capps, Chief of the Bureau of Yards and Docks, who has just returned to the United States from an extensive tour of European shipyards.

The New York Shipbuilding Company, which is to construct the Arkansas, was notified some time ago that turbines would be installed. Decision as to the motive power for the Wyoming, to be constructed by the Cramps, was postponed temporarily, but Secretary Meyer and his associates have decided favorably for the Parsons turbine, feeling satisfied, as Secretary Meyer expressed it, that this would be more advantageous to the Government that the proposed combination of turbines and reciprocating engines, which had been insistently urged by some naval officials.

Newspaper Reporting Extraordinary.

By the use of the electrophone the London *Evening News* was able to print a verbatim report of Lord Rosebery's speech on the Budget proposals the same afternoon, says *The Electrical Engineer,* of London, Eng., the sentences being in type almost as soon as they were delivered in the Glasgow City Hall. The electrophone transmitters, tiny brass fittings, were attached to the rostrum in the City Hall, and in all 2,000 miles of telephone wires were used to connect the hall with Carmelite House. The route was from the City Hall, Glasgow, to the Glasgow Post Office by underground wires, and then, by the overhead trunk system, via Carlisle railway station, Leeds Post Office, Hunslet railway station, Sheffield railway station, London-road Station, Nottingham, Luton railway station, and Finchley-road Station to the York-road Post Office. Then, by underground wires, the route was to the trunk telephone exchange in Carter-lane, and from there to Carmelite House. A staff of a dozen shorthand writers listened to the speech at the London end, each working two minutes at a time and then transcribing his notes. The arrangements were so complete that the slips of "copy" were in the printers' hands a few minutes after the words were heard in London, which was four seconds after they were uttered in Glasgow. The electrophone, as now improved by the introduction of a new transmitter, has been tested over artificial circuits representing 3,500 miles of wire, and gives a loud-sounding reproduction of the voice.

Tungsten as a Valve Electrode.

In an original communication to the Institution of Electrical Engineers, London, Eng., L. H. Walter gives an account of some experiments showing that tungsten, when used as an electrode in an electrolytic cell, gives a pronounced "valve action," or rectifying effect. Several electrolytes were tried, including sulphuric acid, potassium dichromate solution, and others, having for the most part a high conductivity and less adapted to the securing merely of high critical voltages. The critical voltages in the strong acids proved to be, as a rule, higher with tungsten than with aluminum, but not so high as with tantalum. The sensitiveness to heating was not pronounced, but the sensitiveness to cutting of the current proved to be very great. The experiments were carried out and are continued at the South Western Polytechnic Institute.

Association of Car Lighting Engineers.

Second Annual Convention at the Hotel La Salle, Chicago, October 4, 5, 6 and 7.

The second annual convention of the Association of Car Lighting Engineers was held in Chicago, in the convention hall of the new Hotel La Salle. A report of the proceedings of the meetings of Monday and Tuesday, October 4 and 5, appeared in the issue of October 9, on pages 672 and 673.

Undoubtedly the most important feature of the convention was its action on Monday in regard to changing the name of the association to that of "The Association of Railway Electrical Engineers."

As the problem of electrification of steam railroads is uppermost in the minds of railway officials, and as this would necessitate the employment of many electrical men and also a great deal of study of electrical problems, this change of name will mark the beginning of a new era for the association, as it not only includes car-lighting engineers, but will also include engineers and electricians employed by railroads in other branches of electrical work.

The convention's progress during the first year of its life was outlined in the opening address by the president. Among the other notable features of the first two days' session was an excellent address by Mr. Klinck and the reports of the several committees.

WEDNESDAY MORNING SESSION.

Wednesday morning session was opened at 10 a. m. by the president, who introduced George W. Cravens, of Chicago. Mr. Cravens addressed the convention extemporaneously on the subject of "Electrification of Steam Railroads."

Mr. Cravens introduced the subject by asserting that the members of the association he was addressing would undoubtedly be called upon in the future to decide upon questions arising in connection with the problem of electrification. He discussed the arguments in favor of electrifying and compared steam roads with the present interurban and other electric lines. Some of the points brought out in the address of Mr. Cravens were the benefits gained by the passengers on account of the frequency of service which would be possible should the railroads electrify and on account of the increased accommodations which could be offered by maintaining stations closer together. A feature that is becoming a serious one to many railroads is the competition offered by interurban lines in carrying both passengers and mail and express, due to greater frequency in service and having stations at more frequent intervals. In regard to the cost, Mr. Cravens compared the electric lines with steam roads showing the cost of operation to be decidedly less in the case of the former. The methods of electrifying were discussed briefly, Mr. Cravens being in favor of the third rail wherever it is allowable.

The discussion of this address was deferred until after the reading of the next paper. The paper entitled "Train Lighting on European Railways," by Dr. Max Buttner, was then read by J. Henry Klinck.

This paper opened with a comparison of train lighting by electricity with other methods employed by railroads in Europe. Some countries, as, for instance, Russia, still light their trains by means of candles, and, in a few cases, gas. In most other countries the question of train lighting has resolved itself into a comparison between gas and electricity. Although electric train lighting has always been considered favorably, the marked advancement made by gas some years ago led that form of illumination to become popular, but with the recent decided improvements in the electrical field, electric lighting is being considered more highly. The paper outlined the methods of train lighting in vogue, which in nearly every case corresponded to the methods used here. In concluding, Dr. Buttner claimed that the unquestionable advantages of electricity for train lighting will undoubtedly lead to its exclusive use in the near future.

Following the reading of this paper, the discussion of the address of Mr. Cravens was opened by Mr. Pomeroy, who claimed that it was unfair to compare the costs of operation between steam and interurban railways. He claimed that most electric roads are considered as amateurs by the steam roads. The electrification of steam roads would mean the expenditure of about twenty-five per cent more in addition to the money invested. As this is the case, the railroads must be guaranteed an increase in traffic of twenty-five per cent, or a decrease in operating expenses of twenty-five per cent, and then they would be no better off than they are at present.

J. R. Sloan, of the Pennsylvania Railroad, called attention to a division of the road he represents which is used exclusively for freight traffic. The increase in traffic between the points connected by this division has grown to such an extent that two more tracks were necessary. Electrification was considered, and it was found that the operating expenses would be the same in either case, but the entire trip could be made in one-half the time now required by using electricity. This would mean a decrease in the number of cars necessary, which would represent an enormous saving in a year.

J. R. Klinck entered into the discussion by asserting that the question resolves itself into whether or not electrification will save or lose money for the railroads.

O. W. Ott, of the Oregon Short Line, asked Mr. Sloan how electrification of that division would increase the business and whether the present operating conditions could not be bettered to such an extent that the same time could be made as is claimed for the electric line. In reply, Mr. Sloan said that an extended study had been made as to operating conditions and the causes for delay determined. In comparing the two systems it was shown that the average speed possible for the steam train was twelve miles per hour, and that possible for the electric was found to be thirty miles per hour. In making this test the time lost was deducted and the average speed only considered.

Mr. Cravens added that the railroad makes money only when it is moving cars, but the expense constantly goes on just the same. Hence, by reason of being able to operate more cars when electricity is used, the earning capacity of the railroads can be increased. Mr. Seymour, of the Lake Shore & Michigan Southern Railroad, claimed that the electrification that has been accomplished so far on such roads as the New York, New Haven & Hartford, the Baltimore & Ohio, and the Grand Trunk at Port Huron has been on account of the smoke nuisance, rather than an increase in the earning capacity.

WEDNESDAY AFTERNOON SESSION.

The early part of the session Wednesday afternoon was devoted to the continuation of the reading of the report of the committee on standards.

Following this, H. M. Beck, of the Electric Storage Battery Company, read a paper entitled "The Storage Battery in Train-Lighting Service." Mr. Beck said in part:

The most economical way to handle the storage battery is to give it the regular attention it requires, even at considerable cost, rather than to wait until it fails and then try to doctor it back into shape again. The best battery can be ruined in a comparatively short time when it should have given years of service with proper treatment. Cleanliness is an important factor in the consideration of storage batteries. From the time the battery material arrives on the ground until it is worn out the matter of cleanliness cannot be too strongly emphasized. Almost any foreign impurity will cause trouble if gotten into the cell, and some will result in the de-

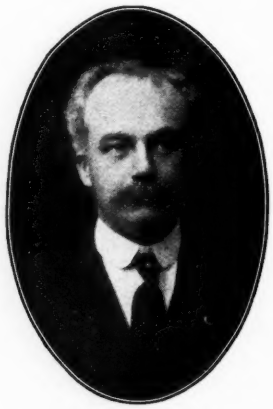
struction of the plates. The initial charge is of extreme importance, for, if incomplete, the plates are not thoroughly worked up and will not show capacity or efficiency, and their life may be materially shortened. A large percentage of trouble in the past has been traced directly to mistakes in putting cells into commission. The charge should be started as soon as possible after the electrolyte has been put into the cells. If the plates are allowed to stand in electrolyte any length of time before the initial charge is started, they sulphate, due to local action. In addition to what might be called mechanical inspection having reference to cleanliness, broken connections, flushing, etc., the proper care of storage batteries necessitates an electrical inspection which aims to determine the electrical condition of the cells. Experience has shown that if the battery is charged too much, the excessive gassing washes out the active material of the positive plates, and thus decreases their capacity and life. On the other hand, undercharging results in sulphating, lack of capacity and rapid disintegration. In order to meet both of these conditions the best plan is to divide the charges into two types, which are called "regular charges" and "over charges." In connection with the subject of discharge, about the only points to be guarded against in railway service are, not to discharge too far, and, when completely discharged, to recharge as soon as practicable. The subjects of "readings," "low cells," "the cadmium test," "replacing evaporation," "restoring lowered specific gravity," "incomplete charging," were taken up and discussed fully by the author.

Following the reading of this paper, a brief discussion was entered into. O. W. Ott asked Mr. Beck what he considered the maximum electrolyte density in charging. Mr. Beck said he could only speak for one particular type of cells, and in that case the specific gravity should never go above 1225. In general, weak gravity is much easier on the plates than strong, and within reasonable limitations will not endanger them. Mr. Hutchinson asked Mr. Beck if ten points above 1225 would make any difference. Mr. Beck said that it is best to have the absolute maximum at 1225.

President Farrelly then asked Mr. Beck how he considers Lake Michigan water for battery use. Mr. Beck replied that the firm he represents had made many tests of Lake Michigan water, and in every case found that it was perfectly safe. The president also asked Mr. Beck what he considers dangerous for the maximum temperature in charging. In replying, Mr. Beck said that, owing to necessity in car-lighting work, the limit, 110 degrees Fahrenheit, was a little higher than he would like. The lower the temperature can be kept the longer life will the cells have.

THURSDAY MORNING SESSION.

At the opening of this session President Farrelly proposed the formation of a club to be known as the "Car Lighting Club," its object to be the bringing together more closely the members of the association who are located so as to meet in Chicago once a month and discuss informally subjects regarding car lighting. This suggestion was received favorably and a motion was made authorizing the president to appoint a committee of six



E. M. CUTTING.

Mr. Cutting, president-elect of the Association of Railway Electrical Engineers, was the founder of the Association of Car Lighting Engineers.

to select a place of meeting for the club, arrange a date and make other incidental arrangements. Following this a report of the special committee on lamps was read by H. C. Meloy, chairman. This gave complete data on all incandescent lamps. After a brief discussion regarding the merits of some of the lamps proposed in the report, the report was adopted upon vote of the members.

GEORGE B. COLEGROVE.

Mr. Colegrove, chief electrician of the Illinois Central Railroad, and secretary-elect of the Association of Railway Electrical Engineers, was secretary of the Association of Car Lighting Engineers.

THURSDAY AFTERNOON SESSION.

The Thursday afternoon session was opened by the reading of the report of the committee on improvements by J. A. Shaw, chairman. Some of the subjects covered in this report were "Axle Lighting," "Head-End Systems," "Straight Storage," "Storage Batteries" and "Illumination." This report was discussed briefly and accepted.

The place of meeting for the next convention was voted upon, and it was decided unanimously to hold the next annual convention in Chicago, October 4, 5, 6, and 7, 1910. It was also decided to hold a semi-annual meeting in Buffalo, N. Y., June 7 and 8, 1910.

The election of officers was next taken up, and the following election announced:

E. M. Cutting, of the Southern Pacific Railway, president.

J. R. Sloan, of the Pennsylvania Railroad, first vice-president.

F. R. Frost, of the Atchison, Topeka & Santa Fe Railroad, second vice-president.

George B. Colegrove, of the Illinois Central Railroad, secretary.

ENTERTAINMENT.

The entertainment committee provided a most excellent programme of entertainment for the members and ladies during convention week. On Monday night an informal dance was held in the ballroom of the Hotel La Salle. On Tuesday afternoon the ladies were taken on an extended automobile trip through the parks and boulevards. Tuesday night a theatre party was given and an enjoyable evening spent. On Wednesday night an elaborate banquet was given in the banquet hall of the Hotel La Salle, followed by an informal dance. Chas. E. Brown, of the Central Electric Company, toastmaster, and the banquet committee are to be congratulated on the manner in which the affair was conducted.

EXHIBITORS.

Elaborate exhibits were in evidence and every appliance suitable for car lighting or heating was displayed in a manner most appropriate, several exhibitors decorating their space so as to represent the interior of a passenger car.

Among the manufacturers represented were the following:

Willard Storage Battery Company, Westinghouse Electric and Manufacturing Company, Westinghouse Lamp Company, Westinghouse Storage Battery Company, The United States Light and Heating Company, Gould Storage Battery Company, Gould Coupler Company, The Safety Car Heating and Lighting Company, The General Electric Company, Adams and Westlake Company, I. A. Bennett Company, Universal Electric Storage Battery Company, Economy Engineering Company, New York Leather Belting Company, Sangamo Electric Company, Central Electric Company, National Electric Lamp Association, Buckeye Electric Company, Columbia Incandescent Lamp Company, Charles L. Klewert Company, Ward Equipment Company, Electric Storage Battery Company, Pyle National Headlight Company, Western Electric Company, Watson Insulated Wire Company, Diehl Manufacturing Company, Dake American Turbine Company, Holophane Company, James Wolff, Oliver Electric and Manufacturing Company, Consolidated Railway Electric Light and Equipment Company, International Electric Meter Company, Standard Underground Cable Company, Tipless Lamp Company, Revere Rubber Company, Peerless Rubber Company.

Chicago Electric Club.

Following the regular weekly luncheon of the Chicago Electric Club in the Grill Room of the Chicago Automobile Club on Wednesday, October 6, Foree Bain, patent attorney and electrical expert, entertained the club with an interesting address entitled, "In the Early Days of Electrical Development."

Considering the advanced stage of electricity today, it is hard to conceive such conditions as those related by the speaker in his early experiences.

Mr. Bain carried his listeners back to the time of the Civil War, when, as a boy, his ambition in life was to become a telegraph operator. He related how, when at school, he fitted up a crude telegraph instrument made of wooden levers and connected it to a companion's desk by means of twine, and when later on he became old enough to be considered seriously as an operator and wanted to practice, how he constructed an instrument, using a Daniel's cell, old zinc from scrap heaps and iron wire.

Mr. Bain's first invention, a self-closing telegraph key, was completed while he was employed as an operator on a southern railroad. It consisted of a treadle located under the operator's bench and connected by means of hand-made levers. One night a dog came into the office and went to sleep on the treadle, thus putting the invention out of commission and ending the dream of the inventor.

Mr. Bain later became interested in telephony, and constructed the first telephone he ever saw. Subsequently he obtained a position as salesman for the Post Manufacturing Company, soliciting telephone subscribers and making his own installations.

A number of interesting experiences regarding incandescent-lamp installations were related. A lighting plant once installed in a hotel by Mr. Bain in those days, caused all of the guests to remain awake during the night in celebration of the event. Incidentally, they could not sleep on account of the noise made by the generating units.

A few years later, Mr. Bain was appointed electrical engineer of the Minneapolis Electric Railways, his duties being to install an electric traction system in St. Paul and Minneapolis. The difficulties encountered in this installation were many. The city ordinance of Minneapolis provided that on certain streets all electrical conductors must be placed underground, and, to comply with this ordinance, Mr. Bain had to do considerable traveling in order to purchase the necessary materials. Probably the most interesting feature of this installation was the manner in which the conductor was laid underground. A number of pasteboard tubes, heavily insulated, were first laid. The question then was, how to get the conductor through the tubes. To accomplish this a contrivance resembling the thumb of a glove was fastened to the end of a cord, and with the aid of a blower this arrangement was shot through the tubes, and later a cord fastened to the conductor and drawn through. Other difficulties met with in this installation were the fitting up and installing of new generating units.

The speaker related a number of such amusing experiences, and told of the many difficulties encountered by electrical men in the early days of electrical development.

New Niagara Power Company.

Incorporation papers of the Genesee Light and Power Company, of New York state, the new corporation formed to take over the plant of the Genesee County Electric Light, Power and Gas Company, which went into the hands of a receiver on October 15, 1908, and which has since been sold by order of Judge Hazel, of the United States Circuit Court, have been filed in the county clerk's office at Batavia, N. Y.

The capital stock is given as $250,000, of which $150,000 is common stock and $100,000 six per cent preferred stock in shares of $100 each. Preferred stock has a preference in the assets in case of a liquidation of the company and dividends up to six per cent from the earnings of the company. The common stock is entitled to dividends up to six per cent, and after that both common and preferred stock shall share alike in the earnings, without preference. The voting power of both kinds of stock is to be equal.

It is understood that the new company will take over the property on October 21, which will be thirty days after Judge Hazel ratified the sale by the receiver. The new company, like the old one, will deal in Niagara power.

It is reported that the police force in Dundee, Scotland, are to be provided in future with electric lamps to replace the customary "bull's-eye" oil lantern.

Would Drop Telephone Suits.

Justice Bischoff, in the New York Supreme Court, reserved decision on Monday in the application of the Public Service Telephone Company, of New York city, for permission to discontinue the suit it began last July for a writ of mandamus to compel the Empire City Subway Company to allow it to run its telephone wires through that company's ducts.

Assistant Corporation Counsel Burr opposed the application upon the ground that the city had a right to intervene.

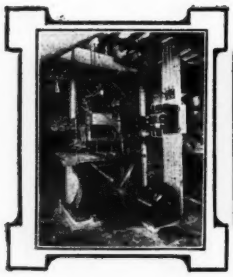
The telephone company obtained its franchise with reference to the telephone business from the Long Acre Light and Power Company, which contended that it had a perpetual franchise for the transmission of electric power through the city, purchased in 1906 for $100, and transferred the telephone part of these rights franchise to the new company, which was incorporated in Albany on June 24, for a term of 999 years.

Metropolitan Securities.

Judge Holt, in the United States Circuit Court, continued S. Sidney Smith as temporary receiver of the Metropolitan Securities Company in the supplementary proceedings instituted by William W. Ladd, receiver of the New York City Railway Company, as a judgment creditor for $5,271,582 and holder of cash to the amount of $1,013,783 and notes and securities worth about $500,000 belonging to the defendant corporation. Mr. Smith would probably have been appointed permanent receiver of the Metropolitan Securities Company had not the Court of Appeals on September 30 refused a rehearing of the matter from the judgment obtained by Receiver Ladd stating that upon proof being offered that application for a writ of certiorari had been made to the United States Supreme Court, a motion for which was pending, the decision of that court would be entertained. Judge Holt, when he took up the matter of receivership on Monday, was informed by Paul D. Cravath that application for a writ of certiorari was to be made and that a stay would follow.

Kentucky Electric Company Bonds.

It is announced that the Kentucky Electric Company has filed a deed of trust with the United States Trust Company, securing $1,500,000 five per cent bonds and has canceled a previous issue of $500,000 bonds.



Industrial Power

EXTENDED USES OF ELECTRICITY ON BOARD SHIP.[1]—III.

BY JOHN MCLAREN.

Assuming the producer requires a certain amount of water. This is used for two purposes, viz., for converting into steam for the production of gas, and for cleaning the gas in the scrubbers. The total consumption for both these items varies from one-and-one-half to two gallons per brake-horsepower-hour. The greater proportion of water is used in the scrubbers, but as there is no objection to the use of sea water for this operation, the amount of fresh water required would be very little. Suction gas is non-odorous and poisonous, but as the whole plant is working below atmospheric pressure and the producer only generates just sufficient gas for the load on the engine, there is no possibility of escape when at work or standing by. When starting up, a small quantity of gas is blown to waste so that there can be no danger from this source.

The usual method of shutting a gas plant down for standing by is to open the waste-pipe cock and the ash-pit door to allow a draft of air to pass through the generator to keep the fire alight. The stand-by loss is the amount of fuel consumed during this period of rest. In Mr. Dowson's book, recently published, on "Producer Gas," will be found a complete comparison of the stand-by losses between gas plant and steam boilers, which shows an enormous difference in favor of the gas plant. When I say that for a given power the gas producer has far less radiating surface than a boiler and occupies less space, has less external settings to be heated up, and, moreover, requires less fuel to make up this loss than in the case of a steam boiler, the enormous difference in the stand-by losses will be more readily understood.

In a paper read by E. Shackleton before the Institute, and reported in Volume 20 of the Transactions, he gives some very interesting figures relating to the coal consumption required for loading or discharging cargo by steam; he bases his figures on a steam plant of 200 brake-horsepower, and gives the fuel consumption of this for twelve hours as 12,000 pounds, and goes on to say:

"Referring to the cargo-discharge consumption, the writer is of opinion that the majority of engineers are acquainted with the excessive fuel consumption of the average steam winch, which (on account of its very low efficiency, owing to condensation losses, etc.) may probably be put at five pounds per horsepower per hour as not too high an estimate." Comparing this figure with the coal consumption of the electrical winch driven from the suction gas alternator, I will refer you to the coal consumption of the gas plant which I gave at 0.85 pound per brake-horsepower-hour on the gas engine. To arrive at the consumption for the winch, we have to take into consideration the distribution losses of the electrical system. I stated this figure was twenty per cent. Supposing that we take this at twenty-five per cent, we shall get a coal consumption of 1.06 pounds of coal per brake-horsepower-hour on our electrical-driven winch, as compared with five pounds of coal for the steam-driven winch. This means that the coal consumption on, say, twenty-four hours' continual work with 300-brake-horsepower gas engine would be just over 4,800 pounds of coal, while the coal for the steam engine would be 24,000 pounds.

Dealing with the amount of mechanism in the two forms I have described, that is, between the producer and the steam boiler, the producer is a comparatively simple piece of apparatus, as no parts of it are subject to any pressure, and after the gas is cleaned and scrubbed no physical change takes place until it reaches the engine, no feed-water pumps are required, and the amount of cleaning required is extremely small. On the other hand, the steam boiler has to be well maintained, as it has to work under high pressure. Care has to be taken with the feed water, and the interior of the boiler must be kept free from scale, etc. The steam can lose a great amount of its heat in the steam pipes. The valve gear of the gas engine is extremely simple, and when once set cannot be tampered with.

As for the alternating-current generator and induction motors, these are simplicity itself, far more simple than continuous-current motors. The losses that occur in the distributing cables at the most only amount to about two per cent, and these cables require absolutely no attention when once installed.

From an article written in *Cassier's Magazine*, by the Marquis of Graham, on the gas-engine experiments in the Rattler, the gunboat stationed on the Clyde for the use of the Clyde division of the Royal Naval Volunteers, and which usually cruises at the week end, we gather the following:

Her description is as follows: Composite construction, single screw, length, 165 feet; beam, twenty-nine feet. Mean draft, eleven feet two inches; displacement, 715 tons; indicated horsepower with forced draft, 1,000 horsepower; speed, thirteen knots; with natural draft, 600 horsepower, speed, 11.5 knots. She was launched at Elswick, October 8, 1886.

Her old boilers and steam engines have been removed and a single set of vertical Beardmore Chaplain suction gas engine and producer installed in their place. The engine is 500 brake-horsepower, five-cylinder, single-acting, bore twenty inches, stroke twenty-four inches, 120 revolutions per minute. The five cylinders are independent of each other. One cylinder could be knocked off for examination, if required, while the other four are working. A magneto is fitted to each cylinder, the ignition being of the low-tension make-and-break type, this type of ignition being considered the most suitable for marine work, as there is so much moisture to contend with. This form of ignition has been running two years without a single failure. The producer is of the usual type, the fuel being anthracite; the steel shell of the generator being

[1] Abstract of paper read on September 4, in the Congress Hall, Imperial Exhibition, Shepherd's Bush, London.

lined with firebricks and with the feeding hopper on the cover, the cover being water-cooled. The fire bars are trough-shaped and placed radially round the producer; the inner ends are supported on a frame. Water is kept circulating through this, and so prevents the edges of the fire bars burning away. The gas after leaving the producer enters the bottom of the cooling tower and leaves at the top. The gas in its upward course comes in contact with water sprays, and is thus cooled and cleared of any grit that may be in it. After leaving the cooling tower the gas passes to the centrifugal drier, in which the fan is revolving at a high rate of speed, and any water that is in the gas is thrown off to the walls of the casing, and is drained away to a water seal. The gas being lighter, remains in the center of the fan, and is then drawn through the cleaner to the mixing valve on the engine and then to the various cylinders. The exhaust gas passes into a nest of tubes through which water is circulating, and the heat from the gas generates steam which is used for the producer.

The engine is started by means of a mixture of gas and air pumped up to ninety pounds per square inch, which is admitted to the cylinder through a specially constructed valve and then fired. The engine invariably starts up with the first impulse and gets sufficient way on to draw in gas from the main mixture. As regards the performance of the vessel, she has run up to date over 1,800 miles at an average speed of eight to nine knots per hour. There is no shoveling coal in a dark and confined space. The feeding of the gas producer is intermittent, and can be done automatically instead of by hand. The heat from the producer is nothing compared to the heat arising from boilers in a stokehold. As regards weight and space, the gas producer saves from twenty-five to thirty per cent of the corresponding item of a steam outfit, but it is in the cost of labor and fuel that one of the chief benefits is to be found. The Rattler as a steam vessel had thirteen stokers and four engineers, now as a gas ship she has three engineers and four helpers. The producer only requires a few minutes' attention every two hours. It was found that starting from all cold took thirty minutes. Consumption of fuel compared with the steam plant was fifty per cent less for the gas plant.

In conclusion, I might mention that the maintenance and depreciation in seagoing installation, such as I have attempted to describe, would not be at all heavy. I think that an allowance of seven-and-one-half per cent is usually reckoned as a fair margin to allow for depreciation of the plant on land installations; perhaps at sea this might be a little heavier, say, ten per cent. As for maintenance, I think that two per cent would cover this item. So we get twelve-and-one-half per cent as an annual charge on the capital outlay of the installation. I think that the comparison which I have endeavored to make between the two systems, that is, the donkey boiler with its scattered units and long lengths of steam piping, and the suction gas plant, with its centralized generator, gives the case fairly for each system.

Effect of Electric Power on Transvaal Gold and Coal Mines.

The commission appointed by the Transvaal government to consider the desirability or otherwise of establishing large power companies, having regard to the effect upon the gold and coal industries and upon the country generally, recently commenced its sittings under the chairmanship of Sir Thomas Price. Its findings, United States Consul Edwin N. Gunsaulus, of Johannesburg, South Africa, reviews as follows:

According to published reports of the hearings, a statement summarizing information obtained from a number of mines was submitted on behalf of the Victoria Falls and Transvaal Power Company (Limited). Under the heading of capital expenditure it was pointed out that for substantial additions to existing plants the saving will be about $5,353 per 1,000 tons of monthly capacity. For large plants which are being newly equipped the leading engineers estimate a saving varying from $5,840 to $9,733 per 1,000 tons of monthly capacity, equivalent to a saving from twenty-five to forty per cent on the total capital expenditure for reduction plants. One of the leading engineers gave an instance of a mine property being brought to the producing stage by being able to purchase power, and, in addition, the saving effected permitted the erection of an additional forty stamps and a proportionate increase in underground developments.

Any means for effecting a saving in capital outlay on plant will materially benefit small mines. In the case of a mine having a short life it is manifestly to its advantage to be relieved from sinking money in plant which may become useless before it is worn out. The engineers of the various mining groups estimate a reduction in working costs of from twelve to twenty cents per ton milled, after allowing for interest and redemption of the capital expenditure necessary to convert existing steam-driven plants to electric drive.

The use of purchased electrical power will enable the mines to save the water now used for generating steam and to utilize it for reduction operations. It is variously estimated that total conversion of a steam-driven plant to electricity will result in a saving of from 120 to 140 gallons of water per ton milled. On the basis of tons milled in the Witwatersrand area during 1908 the saving of water, taking thirty-five kilowatt-hours per ton milled, would amount to at least 800,000,000 gallons of water per annum. During the year 1908, 18,200,000 tons of ore were milled; the coal consumption of the mines in the Witwatersrand area during the same period was 2,124,000 tons, being an average of 235 pounds of coal per ton milled. The mining groups estimate that the tonnage milled in 1911 will amount to 25,000,000 tons. It is a fact that the coal consumption per ton milled by steam-driven plants decreases as the tonnage milled increases. Taking a basis of thirty-five kilowatt-hours per ton milled and a coal consumption of four pounds per kilowatt-hour delivered, the coal consumption per ton milled, if power were purchased, would amount to 140 pounds, which shows a saving of approximately thirty per cent.

Against this reduction, however, must be set the prospective increase in tonnage to be milled in 1911 of 7,000,000 tons, which it is contended will be largely due to the knowledge that cheaper electric power will be available. On a complete electrification of the mines in the Witwatersrand area, the decrease in coal consumption between 1909 and 1911 on the above consumption will amount to some 370,000 tons, or, in other words, to about twelve per cent of the total coal sold from Transvaal collieries in 1908. But as electrification is only contemplated to affect about thirty-five per cent of the tonnage milled, the coal used for the purposes of the gold-mining industry will show an increase of about 100,000 tons in 1911 as compared with 1908. It is contended that the fears expressed of any violent dislocation of the coal-mining industry cannot reasonably be justified.

YEAR'S ISSUE OF SECURITIES.

IMPORTANT DEVELOPMENTS THIS MONTH AND NOVEMBER.

Railroad systems, traction companies and industrial corporations in the United States have issued during the first nine months of 1909 new bonds, notes and stocks aggregating $1,217,305,080, which compares with $1,073,354,626 in the first three-quarters of 1908, showing therefore an increase of $143,950,450. During September several very large railroad loans were to have been offered for public subscription, but conditions were so unfavorable that in each instance delay was decided upon. However, although bond issues fell off, as compared with a year ago, stocks were put out in larger volume September's total contribution to the year's new securities was $151,014,000, an increase of $97,698,250 over 1908, due wholly to stock issues by industrial companies.

The September issues of new securities, as compiled by *The Journal of Commerce* and *Commercial Bulletin*, follow:

RAILROADS.

	Sept., 1909.	Sept., 1908.	Change.
Bonds	$11,676,000	$ 5,500,000	+$ 6,176,000
Notes	6,160,000	20,500,000	— 14,340,000
Stocks	17,528,000	700,000	+ 16,828,000
Total	$35,364,000	$26,700,000	+$ 8,664,000

INDUSTRIAL COMPANIES.

Bonds	$ 8,500,000	$21,800,000	—$13,300,000
Notes			
Stocks	107,150,000	4,815,750	+102,334,250
Total	$115,650,000	$26,615,750	+$89,034,250
Grand total	$151,014,000	$53,315,750	+$97,698,250

The final quarter of 1909 promises to bring heavy offerings provided the market for investments revives. Instead of bonds bearing a fixed rate of interest, however, stocks will be substituted, wherever possible, as the average investor is today disinclined to accept a low return upon his capital and the extraordinary advance on the New York Stock Exchange has emphasized the possibilities of appreciation in the value of stocks as contrasted with bonds. The New Haven Railroad is to issue $40,000,000 new stock, while the Pennsylvania Railroad is to offer at least twice that amount later in October. The general improvement in industry which is confidently looked forward to encourages the hope that industrial as well as railroad stocks will increase in earning capacity, and that higher dividend rates than those now current will be paid by numbers of companies next year.

The telephone business of the United States is designed, according to competent authorities, to become of even greater importance, from a financial standpoint, than even the steel industry. The American Telephone and Telegraph Company is rapidly extending its ramifications by absorbing other companies and developing new territories. Consequently a great deal of new capital has had to be provided. During September the New York Telephone Company increased its capital stock from $50,000,000 to $100,000,000. Another huge industrial issue last month was one of $47,000,000 by the General Motors Company, although there has been no public offering of the new stock; it is claimed by officials that this concern now controls some twelve companies, and that it is bent upon increasing its plants. These two items account for the increase in September's output of securities as compared with the corresponding month of last year. The brighter trade outlook has also fostered an increase in the working capital of numbers of industrial enterprises.

Total authorizations of new securities this year have reached the enormous total of $1,997,024,040, against $1,632,600,672 in 1908, an increase for the current year at the rate of $1,000,000 per diem, or, to be exact, $364,423,368. The great difference between the amount authorized and the amount actually issued is due in part to the poor absorption of new securities already referred to, but it should be explained that in many cases directors formally authorize new capital to be issued later on, but when the stocks or bonds, as the case may be, are actually disposed of no public announcement is made. In considering the financing done in this country no great attention need be paid to the mere authorizations, the issues constituting a more correct guide to the true position. Even the $1,217,305,080 put out this year does not represent strictly new financing, as much refunding has been taken care of, especially as it has been necessary to prepare to meet an enormous quantity of short term notes falling due in 1910—an aftermath of the forced financing done during the monetary stringency that prevailed in 1906-1907.

The following is a detailed list of the industrial bonds and stocks authorized and issued during September. The actual distribution of every item given under the head "issued" may not have been effected; a certain amount of latitude must be allowed so as to present a fair record of the new financing, since frequently no definite announcement is made of the actual placing of loans publicly authorized:

INDUSTRIAL BONDS.

American Cement, Phila.	$ 300,000	$ 300,000
Big Lost River Irrigation, Idaho	2,000,000	2,000,000
Broad Exchange Building	3,450,000	3,450,000
Bronx Gas, New York City	1,500,000	.....
Bush Terminal	12,000,000	.....
Fremont (O.) Power	500,000	500,000
Los Angeles Gas	15,000,000	.....
St. Clair Co. Gas, Illinois	250,000	250,000
Wilmington (Del.) Gas	.....	2,000,000
Total	$ 35,000,000	$ 8,500,000

INDUSTRIAL STOCKS.

American Cement, Phila.	$ 350,000	$ 350,000
Canada Cement, Ltd.	.....	5,000,000
Citizens' Tel., Gd. Rapids	1,500,000	1,500,000
Cluett, Peabody & Co.	11,000,000	.....
General Motors, New York	47,500,000	47,500,000
Gosnold Mills, New Bedford	550,000	550,000
Laurentide Paper, Que.	1,000,000	1,000,000
New York Telephone	50,000,000	50,000,000
Ohio Fuel Supply, Colo.	2,000,000	1,000,000
Scranton Electric	4,000,000	250,000
Tacoma Gas	4,500,000	.....
United Fuel Gas, W. Va.	9,750,000	.....
Total	$132,150,000	$107,150,000

Why Not?

Under the caption "Electrification of Industries," the following letter appeared in the Chicago *Tribune* of October 8:

Chicago, October 7. [Editor of the Tribune.]—The Railway and Engineering Review, speaking of the Snow ordinance for the electrification of the railways in Chicago, says:

"The ordinance professedly is introduced not as a club to the railroads, but with the determination of forcing the smoke nuisance to the issue once for all. But the railroads do not make all the smoke of the city—not more than one-tenth of it, is the competent estimate. To electrify all industrial power of the city, by the way, would cost only a fraction and work only a small portion of the hardship involved in the wholesale railway electrification."

Let us grant the contention. It is not at all chimerical. Consider the loss caused by distribution of coal from the mine to the furnace, estimated as high as 50 per cent, not to mention the loss by smoke, and the waste of ash disposal, furnace space, etc., the danger of the thousands of power plants scattered all over the city, and the many nuisances caused by the transportation of coal and cinders, by the smoke and gases of the furnaces, and the fire risk in every shop and factory. The city of Chicago has not only the power of the drainage canal, but it has the immense coal deposits within practical reach, where power plants could be established, burning the run of mine without waste, and transforming the energy so that it could be transmitted to the city for all purposes of heat, light and power probably with greater economy than the already antiquated system of transporting the coal. You may say that this is quite as feasible as that man will fly, and I think so myself.

JOHN T. BRAMHALL.

Extends Third Rail Zone.

The New York & Harlem Railroad Company has begun laying the third rail between Mount Vernon and White Plains, N. Y., for the extension of its electric zone.

Owing to the inability of the company and the local authorities of several towns along the line to come to an agreement the trains will jump the crossings without electric power.

Important Decision Relating to Water-power Rights.

The State Supreme Court in session at Madison, Wis., has handed down the decision that the Southern Wisconsin Power Company may maintain the large dam which it recently completed at Kilbourn, across the Wisconsin River. This and the hydroelectric plant located there were described in our issue of August 28, 1909. The decision insures the construction of another large dam across the Wisconsin River at Prairie du Sac by the same company. The court proceedings against the company stopped the making of plans, but now the work will be taken up and plans completed.

The Wisconsin State Legislature granted the Southern Wisconsin Power Company a franchise to erect a dam across the Wisconsin River at Kilbourn, and the dam was built. The franchise gave the company the right to condemn lands necessary for flowage purposes. C. B. Whitnall, of Milwaukee, who owned a small tract of land on the river which is now submerged, and the Black Hawk Land Company, of which C. B. Whitnall is president, resisted the condemnation of their lands. The power company instituted proceedings against them in the Circuit Court, and won. The defendants appealed to the Supreme Court, where they lost again.

C. B. Whitnall and the Black Hawk Land Company contended that the Legislature has not the right to authorize the construction of a dam across the Wisconsin River, because the state constitution, as well as the ordinance of 1787, provided that all navigable waters leading into the Mississippi River "should be common highways and forever free as well to the inhabitants of the United States without tax, impost or duty therefor," and that this provision related to physical obstructions in the stream. They also contended that the real motive for the construction of the dam was the generation of waterpower, and that this was a private and not a public use.

In reply to the first contention, the court holds that the section of the constitution quoted does not relate to physical obstruction, saying that this decision is in harmony with repeated decisions of the United States Supreme Court. Further, the court holds, that the State Legislature has absolute power to grant the right to construct these dams, subject only to the right of the federal government to come in under the commerce clause of the United States constitution and take charge of the navigable waters within the state of Wisconsin. The federal government, however, had consented to the erection of the dam at Kilbourn. Replying to the second contention, the court says that the Legislature granted the franchise for the purpose of improving navigation, and that it did improve navigation, and in nowise interfered with it. Perhaps the most important part of the decision was the statement that the generation of hydraulic power for public purposes is a public use and authorizes the condemnation of private property by right of eminent domain.

This decision, besides insuring the construction of the dam at Prairie du Sac, will cause new projects to be put on foot for generating waterpower on the rivers in Wisconsin. The Prairie du Sac project will furnish cheap electric power for the city of Madison and a good part of Southern Wisconsin. Madison is about twenty-five miles from the proposed site of the dam.

The same court held that the dam at Marshall, Wis., cannot be destroyed in order to create a drainage district. The towns of York and Medina recently were organized into a drainage district, which contemplated the removal of the dam, thus destroying the pond. The Circuit Court refused to confirm the preliminary report of the drainage commissioners, holding that the pond created by the dam constituted navigable waters of Wisconsin, and could not be destroyed under the drainage acts. Upon appeal to the State Supreme Court, the Circuit Court was upheld. M.

The Dielectric Strength of Air.

An important research on the dielectric strength of air has recently been undertaken by E. A. Watson of the University of Liverpool, England, and is given as a paper, together with the discussion that arose on it, in the August number of the Journal of the (British) Institution of Electrical Engineers. The potential difference necessary to cause a spark to pass between two small metal spheres at various distances apart, in air, was carefully measured, at air pressures between one and fifteen atmospheres. At the latter pressure it was found that air will stand an electrical stress of 40,000 volts per millimetre, a fact which may soon find an application in apparatus where high insulation is required.

New Queens Bridge Trolley Line for New York.

The New York Board of Estimate has granted to the Interborough Company, which controls the New York & Queens County Railway, a temporary permit to operate its cars over the Queensboro Bridge until the permanent franchise is granted. John Campbell, treasurer of the company, assured the board that passengers on the New York & Queens County lines would be transported over the bridge without paying an additional fare.

The Public Service Commission agreed to the necessary permission for operating the "shuttle" service across the bridge until final disposition is made of the company's application for a permanent franchise, which is pending before the Board of Estimate and Apportionment.

Electrochemical Development in Norway.

The plant of Messrs. A. S. Rjukanfas, of Christiania, Norway, for the production of nitrates from atmospheric nitrogen, is being installed as fast as possible, and when completed will be the biggest of its kind in the world. One-half the order for the electromechanical equipment has been given to the well-known firm of Brown, Boveri & Company, of Baden, Switzerland. This large order consists of five three-phase generators, each rated at 17,000 kilovolt-amperes (at 0.6 power-factor), at 10,000 to 11,000 volts and fifty cycles, with direct-coupled exciters of 130 kilowatts, for coupling to water turbines of 14,000 horsepower at 250 revolutions per minute. Each generator will weigh about 200 tons, the diameter being nearly twenty feet.

Traction Company to Issue Bonds.

An issue of bonds by the Connecticut Valley Street Railway Company not to exceed $700,000 par value has been approved by the Massachusetts Board of Railroad Commissioners. Of the proceeds of the issue, $500,000 is to be applied to the payment and refunding of bonds of several street-railway companies which have consolidated with the Connecticut Valley company. The balance is to be devoted to the payment of the floating indebtedness of the company and to improvements on the road.

The tramways committee of the thriving Yorkshire city of Leeds, England, has decided to promote a bill in Parliament for the construction of a trackless-trolley system in that city.

American Street and Interurban Railway Association.

Annual Convention of the American Street and Railway Association, Accountants' Association, Engineering Association, Claim Agents' Association and Transportation and Traffic Association, Denver, Colo., October 4-8.

The twenty-eighth annual convention of the American Street and Interurban Railway Association was a distinguished success from every point of view. Beginning with the inception of arrangements the elements contributing toward an enjoyable and profitable convention season had moved along so that with the arrival of the special trains from all sections of the country there was never a moment's doubt that this convention would be a fitting successor to the memorable meetings which have heretofore been held. Special trains were run from New York, Boston, St. Louis and Chicago. The special from New York was over the lines of the Pennsylvania, Chicago & Northwestern and Union Pacific railroads. This train made a special run and broke all previous records between Omaha and Denver, making the run in twelve hours and thirty minutes, the fastest previous run being thirteen hours and forty minutes. The trip from Chicago over the Burlington was particularly enjoyable, a luxurious equipment being provided and every provision made for the enjoyment of the passengers.

The entertainment features were distinguished by a large attendance and thorough enjoyment. These included sightseeing trolley trips, automobile rides, the fifth annual supply men's amateur vaudeville and theatrical performance, a wild game barbecue at the White City, and a theatre party at the Broadway Theatre, where Mrs. Leslie Carter was seen in "Vasta Herne." Then there was a brilliant reception on Monday evening, informal dances each evening throughout the week at the Brown Palace Hotel, and a remarkable all-day excursion to Corona, 11,660 feet above sea level, over the Moffat route. An unlooked-for feature which was greatly enjoyed was the concert given to the Manufacturers' Association by Cook's fife and drum corps. This remarkable marching organization has traveled 90,000 miles to give concerts before G. A. R. encampments, and was organized by Colonel Cook, of Denver.

American Association.

The first session of the American Street and Interurban Railway Association was called to order by President James F. Shaw at 2:30 p. m. on Tuesday. The report of the executive committee was read by Secretary Bernard V. Swenson and accepted.

Following the reading of the reports of the secretary and treasurer, President Shaw delivered the annual address. Mr. Shaw paid a glowing tribute to the importance of Denver as a city for the citizens and as a street-railway center. He pointed out the justice and necessity of holding the convention in this western city, and commented especially on the value to the association work of the membership of the western companies. He called attention to the magnitude of the electric-railway companies. In round numbers there are 1,250 operating street and interurban railway companies in this country, with a total of 35,000 miles of single track and 75,000 passenger cars. The total number of passengers carried annually is 10,000,000,000, and the gross annual income is $440,000,000. The total outstanding par value of stock and bonds is nearly $4,000,000,000, and 225,000 salaried employes and wage-earners engaged in these properties receive more than $150,000,000 in compensation for their services.

Mr. Shaw stood squarely upon the proposition that the increased investment necessary in modern equipment made imperative in many cases an increase in rates and rendered particularly burdensome any form of taxation which penalizes the pioneer and man of courage who projected these great enterprises. The improvement in general business and financial conditions and the demonstrated stability of street-railway properties are rendering the marketing of bonds easier, and in all probability there will be released for investment and development a continually growing amount of money.

Mr. Shaw sketched the work which the association had successfully undertaken, the changes which had been brought about and the necessity for co-operation between every element of the organization. The work of the affiliated associations was touched upon, and particular emphasis laid upon the magnitude and value of the manufacturers' exhibit.

The reports of the Committee on Subjects, of the Committee on Active Membership, of the Committee on Associate Membership, and of the committee to Consider Suggestions Contained in the Address of President C. G. Goodrich before the 1908 convention were received and acted upon.

One of the important suggestions made by Mr. Goodrich related to the separation of the meetings of American Association and its affiliated associations. In the report of the present committee it was the sense of the committee that no change be made in reference to the holding at the same time and place the annual meeting of the American Association and its affiliated associations, but that the annual meeting be supplemented by a conference to be held in the city of New York at the time of the winter session of the executive committee, which conference shall be opened only to the president or other duly accredited representatives of the member companies, and which shall consider in executive session such matters as may be deemed of pressing interest and report to the executive committee in respect to policy.

Ernest Gonzenbach, president and general manager of the Sheboygan Light, Power and Railway Company, Sheboygan, Wis., read a very interesting paper entitled "Organization, from the Standpoint of the Smaller Companies." Mr. Gonzenbach analyzed the conditions under which the work of both the larger and smaller companies were similar and indicated the lines wherein each departed from the other. Mr. Gonzenbach was strongly in favor of a strict adherence to a military form of organization and the proper training of subordinates in every department so that the company might never be left upon the resources of an individual.

This paper was discussed very agreeably by D. A. Hegarty, of Little Rock, Ark.; P. P. Crafts, Clinton, Ohio; Mr. Foster, of New Orleans; H. W. Blake, of the *Electric Railway Journal*, and Gen-

eral George H. Harries, of Washington, D. C.

Mr. Blake said that the reference to the statement which Mr. Gonzenbach had made in his paper concerning the difficulty of securing men properly equipped to handle car maintenance problems was important and that probably these suggestions should be considered in connection with the work of the committee on education, looking to the education of young men by railway companies for this character of the work.

General Harries warmly endorsed Mr. Gonzenbach's idea of a military organization and described briefly some of the instances in his career which substantiated the estimate of the value of such organization by Mr. Gonzenbach.

The report of the committee on education was presented by Mr. Blake in the absence of the chairman of the committee, Professor H. H. Norris.

The Wednesday meeting of the association was devoted to a discussion of the report of the committee on interstate commerce commission affairs and the report of the committee on compensation for carrying United States mail. The discussion on the latter subject was not completed and was carried over until the next session.

The last meeting of the American association was held on Thursday afternoon. The report of the committee on compensation for carrying United States mail was approved. The report of the committee on insurance and public relations was discussed at length.

The report of the committee appointed last year on an electric railway dictionary to be published by the McGraw Publishing Company was presented by Paul Winsor of Boston. Progress is being made with the work and it is expected that before the next convention the compilation and publication will be completed.

The report of the committee on the award of the J. G. Brill Company prize for the best essay on the subject "Design of an Electric Railway Car for City Service," was announced.

The report of the committee on nominations was presented. This report was accepted unanimously and the following declared officers for the ensuing year:

President, James F. Shaw, chairman board of directors, Boston & Worcester Electric Companies, Boston, Mass.

First vice-president, Arthur W. Brady, president, Indiana Union Traction Company, Anderson, Ind.

Second vice-president, Thomas N. McCarter, president Public Service Railway Company, Newark, N. J.

Third vice-president, George H. Harries, second vice-president, Washington Railway Electric Company, Washington, D. C.

Fourth vice-president, Charles N. Black, vice-president and general manager, United Railroads of San Francisco, San Francisco, Cal.

The executive committee of the association consisted of these gentlemen and the presidents of the four affiliated associations who were elected as follows:

H. S. Swift, secretary Toledo Railways & Light Company and president of the Accountants' Association.

F. H. Lincoln, assistant general manager Philadelphia Rapid Transit Company and president of the Engineering Association.

E. C. Carpenter, claim agent, Indiana Union Traction Company, Anderson, Ind., and president Claim Agents' Association.

R. I. Todd, vice-president and general manager, Indianapolis Traction & Terminal Company, Indianapolis, Ind.

After a brief address by President Shaw, who thanked the members for the honor conferred upon him in re-electing him to office, he called upon the four vice-presidents, each responding in turn.

Several resolutions were passed voicing the appreciation of the association for the courtesies extended by the Denver City Tramway Company and its officers, for the splendid work of the Manufacturers' Association, to the technical press, to the officials of Denver, and the members of the American Association and its affiliated associations.

Accountants' Association.

The meetings of the Accountants' Association were held on Wednesday morning at the Savoy Hotel, and on Thursday and Friday in the Rose Parlor of the Auditorium Building. In addition to the annual address of the president, the reports of the executive committee, the secretary-treasurer, the committee on standard classification of construction and equipment accounts and form of report, the report of the joint committee on shop accounting and routine business, the following papers were presented:

"Interurban Statistics" by S. C. Rogers, treasurer and secretary, Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.

"The Census and Electric Railway Statistics" by W. M. Steuart, chief statistician for manufacturers, Bureau of Census, Washington, D. C.

"The Electric Railway Auditor, his Duties and Relation to the Organization," by W. B. Brockway, chief accountant, Ford, Bacon & Davis, New York, N. Y.

"Pay-rolls and Time-keeping," by N. E. Stubbs, auditor, United Railways & Electric Company, Baltimore, Md.

"Stores Accounting and Inventory" by E. S. Pattee, secretary and controller, Twin City Rapid Transit Company, Minneapolis, Minn.

The following officers were elected:

President, H. S. Swift, secretary and auditor, Toledo Railways & Light Company.

First vice-president, A. L. Linn, Jr., general auditor, New York State Railways.

Second vice-president, A. S. Michener, comptroller, Stone & Webster Management Association.

Third vice-president, N. E. Stubbs, auditor, United Railways & Electric Company of Baltimore.

Secretary-treasurer, H. E. Weeks, secretary and treasurer, Tri-City Railway.

Executive committee, Robert N. Wallis, treasurer, Fitchburg & Leominster Street Railway; W. J. Thorp, auditor, Little Rock Railway & Electric Company; R. Morrison, Jr., secretary, Michigan United Railways; D. S. Mitchell, auditor, Pittsburgh Railways.

Engineering Association.

The first session of the Engineering Association was held on Tuesday afternoon, October 5. Paul Winsor, of Boston, president of the association, called the meeting to order at 2:15 o'clock and presented the annual address. Mr. Winsor referred to the wide distribution of the reports of the committees and asked for a full discussion. He emphasized the importance of the work the association was doing and the benefits which every member could derive by taking a wholesome and consistent interest in the work. He called attention to the untiring efforts which secretary and treasurer Corning had expended in furthering the work of the association and in facilitating the preparation of reports by the officers and committees.

The president announced that he would be obliged to attend the meeting of the American Association and Vice-president F. H. Lincoln took the chair. The reports of the executive committee and of the secretary and treasurer were presented and accepted.

The report of the committee on way matters was then taken up.

The committee has given its principal consideration to the subject of "The Use of T-rails in Paved Streets," and also submits a brief report on the subject of "The Use of Open-Hearth and Manganese Steel Rails." The committee recommends the use of T-rails in paved streets except where the traffic is confined to the railway strip or is so congested that the strip is continually used by vehicles. Under these conditions it is the opinion of the committee that a rail of girder section should be adopted, preferably sections following closely the lines of the two Trilby rails recommended by the committee on way matters of the American Street and Interurban Railway Engineering Association of 1907. In this section the rail is made coin-

cident with the wheel loading, seven inches and nine inches in depth, and at the same time provided with a deep, roomy, self-cleaning groove that incidentally does not increase power consumption, besides a substantial, heavy beveled head to suit the street paving, and which allows a maximum wear. In regard to the use of open-hearth and manganese steel rails the committee has received reports from only thirteen companies that have used open-hearth rails and but one company that used manganese rails. This service has been of such short duration as to preclude any recommendations based on actual experience.

The discussion on this report was opened by C. H. Clark, Cleveland, Ohio. Mr. Clark did not think that the rail with the seventeen-thirty-seconds-inch web was quite strong enough. Concerning the laying of tracks in Cleveland, he puts ten inches of concrete longitudinally under the rail and digs tie holes to the bottom. With a five-inch tie there is five inches of concrete under the tie and ten inches under the rail between the ties. They put in concrete first between the ties and under the rail, and then fill the space left in between with dirt so as not to have over five inches of concrete under the pavement. Concerning T-rail construction he is in favor of this but considers that in the larger cities where the teams follow the track there is some uncertainty about the pavement holding up unless granite is used.

George Weston, Chicago, said that the Chicago City Railway Company and the Chicago Railways Company are confined to the use of a grooved type of rail by ordinance. It is his impression that engineers prefer a T-rail track where the pavement can be laid so as to withstand traffic and abrasion. The Calumet & South Chicago Railway Company has recently had an ordinance passed which carries with it the right to allow the use of Shanghai rail track construction on certain streets in outlying districts. Very little T-rail construction has been laid up to this time, and where it has been installed it has met with serious objection from aldermen and other city officials and teamsters and citizens generally. Up until about two months ago the paving done with the T-rail track construction was brick with a groove in the brick that fitted up against the rail and the flangeway ran in a groove formed by the track. Heavy teaming resulted in the abrasion or breaking down of this groove or nose on the side of the track. Mr. Weston did not approve of digging the tie holes for steel ties as suggested by Mr. Clark. He has concluded that the better construction is to excavate the track to one level throughout and have the concrete all of the same level, and roll the foundation. In rolling the foundation a great many soft places are discovered which would probably not be found if the roller were not put on. It is expected that ties treated with chloride of zinc will be preserved against decay when imbedded in concrete. It is intended to preserve the tie from destruction by the action of the rail by the use of tie plates in street-railway construction where the track must be built and the street closed before the cars can be put on the track. It is necessary to have the tie-plate home and in place before the cars can be put on the track in order to have the tie-plate become a part of the tie. In Chicago it is fastened to the tie with lag screws, and if there is any movement of the rail it expends its action on the tie-plate and does not destroy the fiber of the tie. The basis of the Chicago construction has been a substructure and a superstructure intended to keep the concrete and tie intact, using screw spikes and renewing the superstructure as might become necessary. Mr. Weston said he had considerable trouble with the paving coming up both on the inside and outside of the rail.

Mr. Clark said that in Cleveland with all new tracks they are now laying a six-inch vitrified sewer pipe buried in ashes. This pipe is laid in the center between the tracks about a foot below the bottom of the ties, and connected with every manhole at about every fifty feet. An open space is left about a foot wide which is filled with broken stone. Mr. Weston said that in Chicago he has recently adopted a method of putting in track drains, particularly at street intersections, in the hope of reducing the trouble from water getting through the joints.

R. C. Cram, of Connecticut, described a track construction under girder rail where a trench nineteen feet wide, two feet below the grade of the top rail, is used. Across the trench there is a concrete trough with sides, strips outside, sloping slightly from the center. This trough is drained at about every one hundred feet, or at every point where a manhole is located. On the concrete foundation either crushed stone or gravel is laid, and the hard track construction, well tamped, is put on top of this. Then the pavement is placed on top of that, using a six-inch concrete piece and the ordinary cushion, above this brick or asphalt or wood blocks. This makes a very good construction, overcoming the chief cause of trouble, which apparently is a poor, yielding base. The company is not in favor of girder rail and does not use it except where the political conditions compel it. They are thoroughly in favor of the T-rail, and even for work in a small town it is found that they can construct a five-inch or even a six-inch macadam roadway with this rail and have very good success with it. It is his impression that when the various forms of girder rail are considered and the expense of rolling these and making special rollers is taken into account, the T-rail is preferable.

W. H. McAlonev, of Denver, in reply to a question, said the heaviest car on the Denver City Tramway system, forty-three feet, three inches over all, with a seating capacity of fifty-two, and equipped with four forty-horsepower motors, is 43,000 pounds. He thought, however, that the weight of the car would hardly determine the question as to what type of rail to use. A twenty-ton car, stopping every two minutes, could be operated on the same section of rail or roadbed longer and with less damage to the track than could a fifteen-ton car stopping every thirty seconds. The thrust of the car has a great deal to do with the damage done to the track.

M. Schrieber, of Jersey City, N. J., called attention to the great number of sections which are in use today. This means that the steel companies are paying out money to store and keep in repair these different rolls and are paying money on an investment that should in a great part be wiped out. It is to be hoped that the seven sections suggested will be adopted as standards and that railway companies will begin to order the rail for their renewals according to these standards.

A letter from C. G. Young, of New York city, was read. Mr. Young stated that the companies and cities which have had the greatest experience with T-rails in paved streets are its strongest advocates. With regard to paving where a concrete paving is used it is acknowledged that a smooth type of paving surface is preferable to a granite block. The block paving is generally expensive, is noisy, retains water in the joints, and the late Colonel Waring, who was Commissioner of Street Cleaning in New York city, estimated that the cost of cleaning rough pavements would pay the interest and depreciation on the total cost of smooth surface pavement. If the general use of granite pavements is discarded it is immediately found that the principal argument in favor of a grooved or flanged section of girder rail disappears. He was of the opinion that it is quite safe to assume that if we had not started with the use of granite block paving we would now be using a much greater percentage of T-rails in paved streets.

In closing the discussion, Mr. Ackerman presented several recommendations for the committee on way matters: For track construction where the type of pavement will permit, as in a macadam or other shallow pavement, T-rails weighing not less than eighty pounds per yard; for the heaviest service in connection with deep block pavements, T-rails seven inches high, six-inch base, seventeen-thirty-seconds-inch web, two-and-three-fourths by one and eleven-sixteenths-inch head, and weighing about one hundred pounds per yard; for light service in connection with deep block pavement, T-rails seven inches high, six-inch base, seven-sixteenths-inch web, two-and-one-half by one-and-nine-thirty-seconds-inch head, and weighing eighty pounds per yard; for heavy service in connection with deep block pavement on streets where the traffic is confined to the railway strip have Trilby sections as shown in Volume I of the Proceedings of the Engineering Association for 1907.

After considerable discussion it was moved and carried that the recommendations be referred to the committee on standards with instructions to pass upon them as soon as might be consistent. It was also moved and carried that the paper

as a whole be received with a hearty vote of thanks to the committee.

WEDNESDAY MORNING SESSION.

The Wednesday morning session was called to order at 9:45 o'clock. The report of the committee on equipment was taken up.

The committee on equipment, owing to the enlargement of its scope, embraces in its report the work covered by the committee on maintenance and inspection of electrical equipment, control and economical maintenance. Its duties also include suggesting to the committee on standards any new and appropriate standards or desirable changes in existing standards relating to equipment. This report was voluminous and replete with valuable information concerning the following topics: Economical maintenance, car weights as affecting operating costs, carbon brushes, steel tired vs. rolled steel wheels, proposed standards for rolled steel wheels, proposed change of flange contour for interurban wheels, proposed gauge for mounting car wheels, heat treated carbon steel axles, knife vs. snap switches for car and carhouse light circuits, impregnation of field coils, 1,200-volt direct-current car equipment, and recent developments in railway motor control. Direct current at 1,200 volts has been adopted in preference to 600 volts as the trolley potential of a number of interurban and other railways on account of lower first cost and lower cost of operation. With dense traffic, where cars are required to run on a very close headway, consequently giving practically a uniformly distributed load, the substations at 1,200 volts can be located twice the distance apart as at 600 volts for the same maximum per cent line loss. The adoption of commutating poles has made the operation of 1,200-volt generators entirely practicable. Either the third rail or trolley wire can be used for carrying current to the car. No radical departure from standard 600-volt practice is required in the line construction to insure a safe insulation. The catenary form of suspension is usually recommended. The committee proposes for adoption standards for rolled steel wheels, as shown in the report.

A communication from John Lindall, superintendent of rolling stock and shops of the Boston Elevated Railway, was read. With regard to the committee suggestion with reference to trolley wheels, that it is economical to increase the life by increasing the diameter on suburban lines and later transferring them to city lines, Mr. Lindall discarded it. He is of the opinion that in order to maintain perfect contact between trolley wheel and wire it is very desirable to make the wheel and outer end of the pole as light as possible, and on some of his heaviest and fastest equipment he has been able to obtain better service from a four-inch wheel than from larger wheels of the same composition. It is also desirable to have a certain amount of spring in the trolley pole where this can be obtained without interference with the trolley wire at low points. With regard to car weights as affecting operating costs, undoubtedly much of the present unnecessary weight in cars is due to lack of proper appreciation of the cost of carrying weights and to patch-work methods of overcoming failures. Where failures occur it is the usual practice to increase the strength at that point by increasing the weight without giving consideration to the removal of the cause of the failure or obtaining more suitable material.

Considerable discussion brought out the opinion that increasing the diameter and slotting eliminated a great many troubles.

The point was also brought up that after the commutators have been grooved careful attention must be given to cleaning out the slot. In this connection Mr. Evans stated that in the device used in Buffalo an air jet is kept playing on the groove, which serves the double purpose of keeping the dust out of the operator's face as well as cleaning the slots.

In reply to a question, Mr. Taylor said that in slotting out the commutators he used saws proportionate to the thickness of the mica. Various saws are used and the endeavor is made to get a saw that is about the same thickness of the mica. As far as the diameter is concerned, this will run from one to two inches.

With regard to trolley-pole tension, Mr. Roberts said that the regulations require the trolley wire twenty-two feet above the track. In one place eight railroad tracks are crossed and there are some bad curves. He is using a twelve-and-one-half-foot pole with a tension of twenty-five pounds.

In opening the discussion on car weights as affecting operating costs, M. V. Ayres, who had charge of this section, stated that it had been a matter of surprise to him to discover the proportions of the effect of weight in any consideration. One of the first ways to approach the matter is to consider the effect in increasing power consumption. This, however, is not simple, because, although the cost of power should be somewhere near proportional to the weight, his study of the subject had impressed him with the idea that there were many other considerations involved.

Mr. Schrieber said that he had occasion to make some computations to determine whether it would be better to operate with five twenty-ton cars on one line of his road or to operate four forty-ton cars, intending in the latter case to increase the speed of the cars. One of the situations which immediately arose was the fact that in order to operate the heavier cars three or four bridges on the line had to be strengthened in order to take the extra load. This, of course, is an extraordinary case, but it indicates the other things which arise in making these determinations. The general conclusion was that it was not economical to operate the forty-ton cars in place of the lighter cars even if one car could be taken off.

In discussing this question, Mr. Lincoln said that much could be accomplished by educating the men to regulate the consumption of current. There are many divisions on the road where no current at all is needed, and others where either series or parallel connections will make a considerable difference in the overall consumption of current.

Mr. Roberts said that three men were selected on his road and put on their mettle to make a good showing. One of the three men operated the car over the specific distance with a ratio of consumption of 219 to 187 to 160.

Mr. McAloney called attention to the elimination of weight by the proper selection of the wood used in car construction. In many cases a lighter-weight wood could be used without sacrificing strength and without sacrificing appearance.

Mr. Evans called attention to the fact that by removing parts that were unnecessary if the car were always operated from one end, without taking into consideration at all the redesigning or remodeling of the car, he would be able to remove over 2,000 pounds. Apropos of this, he said that on one system he had experienced a great deal of trouble with broken axles. The cars were loaded pretty heavily and the axles were giving out. A heavier truck was designed, with heavier axles and heavier wheels. While the earlier trouble was eliminated, it was found that it was transferred from the breaking of axles to trouble with the track.

The question of carbon brushes was next taken up. L. W. Vacques, under whose direction this portion of the report was prepared, said that the improvement that has been made by the manufacturers within the last two years is very noticeable, although no specifications have yet been made and can hardly be made under the different conditions which apply owing to the grooving of commutators, the grades of mica, etc. Much good will be done by the engineers co-operating with the manufacturers and making tests for individual cases. The tests that were recommended last year have been carried out by most of the manufacturers, and they are using that test now before furnishing brushes to the railway companies. It is noticeable that twenty-three companies have gone from the low-grade to the high-grade brush within the last year, with the greatest satisfaction.

The section on steel-tired versus rolled steel wheels was taken up. The suggestions of the committee were referred to the committee on standards for action as promptly as possible. It was moved and carried that the recommendation of the committee to change the flange contour from the adopted standard be stricken from the report.

The recommendation covering the gauge for mountain wheels was referred back to the committee. The following resolution, "That the Engineering Association take up and investigate the question of a desirable system for the government and instruction of regular apprentices in the mechanical trades in connection with the maintenance of the equipment of electric railways," was referred to the incoming executive committee.

WEDNESDAY AFTERNOON SESSION.

President Winsor called the meeting to order at 2:15 o'clock. The discussion of the report of the committee on equipment was continued.

W. P. Barber of the Midvale Steel Company, of Philadelphia, in answer to an in-

quiry, said that his company had just completed 700 axles for the Interborough Rapid Transit Company, of New York City, after Mr. Doyle's specifications. Mr. Doyle included these specifications in the report which was prepared under his direction. These specifications called for 50,000 pounds elastic limit, twenty-two per cent elongation, thirty per cent discard. This requirement is superior to the requirements of the Bureau of Steam Engineering of the United States. What they call their Class A material requires 50,000 pounds elastic limit, twenty per cent elongation, and leaves it optional with the manufacturer whether he will put out heat-treated material or material containing the proper amount of nickel to give the additional extension while maintaining the elastic limit to a point above 50,000 pounds. Mr. Doyle's requirements can be reached and exceeded in the ordinary type of axle—say the 5.5 inch in diameter—by using a very pure carbon steel properly treated. The tests which were developed to meet this requirement brought out several curious facts. Few specifications today call for a cold bend. From axle material such as would pass the ordinary requirements—say 80,000 pounds tensile and 40,000 pounds elastic limit—with twenty per cent stretch, the same steel after it received the heat treatment made necessary by the requirements of the Interborough gave astonishing cold-bend results. While the untreated material which is represented in all axles now in use will give a cold bend which will break at about thirty per cent, the treated material having 20,000 pounds additional elastic limit, bent cold flat and bent down hard with no sign of failure. An axle is practically never bent; if it is it goes out of service, yet there is a species of axle failure which is the direct result of repeated bends applied progressively on opposite sides of the axle and various tests show that clearly, by rotating the piece and applying the stresses up to or near the elastic limit while the piece is being rotated.

J. L. Replogle, of the Cambria Iron Company, said that if he had any criticism to offer on the specifications it would be that they are not quite severe enough. This company had made several thousand axles for the Interborough to this specification. Very heavy hammers were used for forging these axles, this effect being shown on the end of the forging, which is convex, showing that the effect of the heavy blow has penetrated the forging and forced it from the center. His company is a firm believer in the absolute necessity of annealing. He does not believe that any forged products show their intrinsic value when without a hot treatment for forging. The axle should be put in the cool part of the furnace and gradually worked up to the heat, so that the interior of the forging would be of the same temperature as the exterior.

In reply to a question, Mr. Replogle said that he believed for an axle of five inches or 5.5 inches for service of this kind that no hammer under 10,000 pounds fall should be used, as he did not think there would be a proper penetration with a lighter hammer. He did not believe that this should be inserted in the specifications, however, as there are many axle manufacturers who do not have hammers of this weight and who even without that may be able to make a forging entirely in accordance with the specifications.

It was moved and adopted that this specification be referred back to the committee for further investigation and reported. It was also moved and adopted that the report of the committee on equipment be accepted and printed in the minutes, and that a vote of thanks be extended to the members of the committee.

The report of the committee on power generation was then taken up.

There do not yet appear to be any thoroughly definite conclusions that may be deduced from replies received that would be safe for the committee to advance upon the subject of flue-gas analyzers. It is conclusively shown from the many replies received that the efforts of engineers to make flue-gas analyses have caused many investigations into the actual conditions existing in boiler rooms, resulting in much closer attention to methods of firing and a correction of many defects in boiler and furnace settings. From the replies received this year it appears that opinion is divided upon the question of what benefit is to be derived from the practice of making flue-gas analysis. The committee believes that the subject should be referred to next year's committee for further investigation, possibly to the extent of causing experiments to be conducted along definite lines. With regard to steam meters, it was found that there was but very little information of a reliable nature to be obtained. There is quite an interest in the subject, and many engineers are looking for a meter that is reliable for measuring steam when steam is supplied to turbine or engines. The committee finds that it is practically impossible to make an extensive report on this subject on account of its inability to locate any steam meters in service measuring steam supplied to turbines and reciprocating engines. Such information as the committee has been able to obtain shows quite conclusively that the steam meter has not yet been developed to the point at which it may be said to be entirely satisfactory for measuring accurately the quantity of steam supplied to large units where the steam is superheated or of intermittent flow. With regard to characteristic features and operating records of low-pressure turbine plants, three years' operation has demonstrated that the exhaust, or low-pressure, turbine has fulfilled very largely the expectations of the manufacturers and designers, and the past year has witnessed a number of installations.

Charles Hewitt explained some tests which he had made with the boiler setting made impervious to several degrees to air infiltration, and indicated the great variation which the flue gas analyzed showed on the content of carbon dioxide.

B. F. Wood, of the Pennsylvania Railway Company, said that recent tests which he had made indicated that there is a peculiar diversity in the composition of gas depending upon what point in the flue the sample for analysis was taken from. Mr. Hewitt said that he also had found this to be the case and that almost any percentage of carbon dioxide could be obtained by taking the gas at different points.

Mr. Winsor said that while the question of gas analysis would perhaps not show much in itself it was a good way of studying what is being done in the boiler-room and firing-room, and shows whether the fireman was firing too heavily and leaving the door open too long; in this way many matters of interest are discovered.

The subject of steam meters was taken up. F. E. Case, of the General Electric Company, stated that the Recording Flow Meter will accurately record the rate of flow of steam in pounds per hour in any diameter pipe at any condition of temperature, pressure or moisture met with in commercial practice.

Mr. Hewitt said that the installation of a steam meter in his plant had revealed a very interesting state of affairs, which will ultimately pay for the meter in the saving that will be effected.

The subject of low-pressure turbine plants was then taken up. Mr. Hewitt said that he had two low-pressure turbines, each of 800-kilowatts capacity, in service, which have been working very satisfactorily for two years. With turbines carrying from sixteen to twenty per cent of the total load of the station the coal consumption has been reduced from an average of 4.4 to 3.75. If he had enough turbines to take all of the exhaust steam in the station it would undoubtedly be much better. The relative economy depends on the original design of the station. He is of the opinion that the percentage of economy is higher with non-condensing single-cylinder engines and somewhat less with non-condensing compound engines, and still less with compound condensing engines.

Mr. Roberts contributed a long discussion based on the committee's work.

In continuing the work of the committee it was suggested and adopted that they investigate the subject of condensers. At the present time information on condensers is somewhat mixed and there seems to be no standard either in design or cooling surface. This suggestion was later expanded to include the question of forced draft.

THURSDAY MORNING SESSION.

President Winsor called the meeting to order at 9:50 a. m. In introducing the report of the committee of standards, Mr. Winsor said it would be impossible, probably, to get a committee to agree on every item of a specification, although he opined that anyone's opinion of them would be that they were good in general.

The committee reports that no recommendations are submitted nor suggestions made for changes or alterations in the standards and recommended practices that have been adopted by the association at the 1907 and 1908 conventions. These standards have met with general approval and there is an increasing tendency to adopt them as standard practice with a larger number of the electric railway companies throughout the country. The fol-

lowing is a summary of the committee's recommendations:

(a) Gears and pinions: That this subject be continued for another year.

(b) Standard taper for pinions: The adoption as a standard taper for pinions, the proportion of one-and-one-fourth inches in diameter to one foot in length.

(c) Standard gear ratios: That the subject be continued for another year.

(d) Specifications for wrought-iron bars and limit gauge with table of sizes for round iron: The adoption as standard of the specifications for wrought iron bars, as given on pages 6 and 7 of this report; also the adoption as recommended practice of the limit gauge for round iron and the table of sizes of limit gauges for round iron, as given on page 8 of this report.

(e) Axles: The adoption as standard of the specifications for steel axles, as given on page 9 of this report.

(f) Rubber-covered wire: The further consideration of this subject, as reported on by the committee on power distribution, favoring the adoption of the standard specifications of the Railway Signal Association, as suitable for the recommended practice of this association.

(g) Adoption of standards: The committee further recommends that the adoption of standards be by letter ballot, as given on pages 10 and 11 of this report, and also that the necessary changes in the constitution and by-laws be made subject to the approval of the executive committee.

(h) Reprinting of standards: The committee recommends the reprinting of the standards and recommended practices in the annual report of the association, as given on page 12 of this report.

Mr. Heywood said that the executive committee laid out certain work for the committee on standards, as follows: (a) Gears and pinions; (b) standard dimensions, with particular reference to standard taper for pinions; (c) standard gear ratios ;(d) iron for brake riggings; (e) axles; (f) rubber-covered wire. At the meeting which was held in Atlantic City it was decided that this committee did not have the proper matter before it definitely to recommend on these subjects, it being the ruling of last year's convention that matters for consideration by the committee should come from one of the other standing committees. It was brought to the attention of the chairman, however, that the committee on power distribution was considering the subject of rubber-covered wire, and that matter was referred back to that committee. The manufacturers' representatives were present to give their opinions on the standardization of taper and standard dimensions of gears. The consensus of opinion among them seemed to be that it was practically impossible to standardize the distance between axle and armature shaft centers at the present time. They were also at odds on the subject of standard taper, but that was a subject on which they thought they could get together later. The manufacturers brought up the point that the standards which had been adopted already were not being used quite as extensively by member companies as they would like to see them used, and it was resolved that this matter be brought to the attention of member companies through a circular letter to be sent out by the president of this association and endorsed by the president of the main association. It was brought out that some companies had bought material other than standard when they could just as well have bought standard material. The committee was helped considerably in its work by the Master Car Builders' convention, which was then in session at Atlantic City.

President Winsor remarked on the standardization work of the J. G. Brill Company, and said he had written to other manufacturing concerns, calling their attention to what the Brill people had done and asking them to do the same kind of thing.

W. G. Gove, of the Brooklyn Rapid Transit Company, said that his company has about 4,000 cars, of which about 3,400 are scheduled. The greatest real benefits to be obtained, he said, means the standardization of the organization, the standardization of the management, for that matter, but more than anything else the education of all to the possible value and benefits to be derived from the standardization of the equipment. His company had spent about $40,000,000 in the last five years in rebuilding the property and getting it in its present condition. Everyone of the ten operating companies comprising his company owned equipment six years ago, because the Transit Development Company, which is the latest company, had already begun the purchase of equipment, and on the elevated division it meant the co-ordination or really the standardization, with a view to the interchangeability of all the equipment. Mr. Gove proceeded to tell in detail of the efforts toward standardization his company had made. Referring to operating costs, he said that one cent per car mile, while a reasonably fair figure for the roads in the past, is a little difficult to reach sometimes with a large car, four-motor equipment, air brakes and large seating capacities. Continuing, he said that the moment you get a contract for equipment that puts it on a car-mile or ton-mile basis you must necessarily have the active co-operation of the manufacturer. The operating man does not know it all by any means, but he knows certain features that the manufacturer does not know. The manufacturer is an expert in his particular line and will unquestionably know things that the operating man not only does not know, but does not have time to investigate. Taking as an example the question of wheels, Mr. Gove said that if it has not been reached today, and he thought it has, the point will be reached where you can obtain wheels of the American Street and Interurban Railway Association standard at less cost than the many special wheels that most every road has been providing in the past, and he did not believe that you could get a more concrete example of the real benefit of standardization than the case of the wheels. Mr. Gove then went on to talk about the question of properly educating the working force, and gave the details of the Brooklyn company in keeping a graphical record of all the costs and results in the operation of the road. In conclusion, and digressing somewhat from the trend of his former remarks, he told of the efforts in Brooklyn toward improving the attractiveness of the grounds around the shops by means of gardens.

President Winsor approved heartily of this last-mentioned policy.

Purchasing Agent P. J. Honold, of the Utica and Syracuse roads, said that he did not believe that any purchasing agent with any common sense intends to antagonize the engineer or attempts to dictate to him what he ought to use on his equipment. The purchasing agents are perfectly willing to work in co-operation with the engineer, but believe he ought to furnish them with specifications and tell them just what he requires. In this way it would put the manufacturers on an equal basis and give the agents a chance to get rock-bottom prices.

President Winsor then proceeded to take up the recommendations of the report in order.

James Heywood moved that the subject of gears and pinions be referred back to the committee on equipment for consideration for another year. This motion was carried.

The next recommendation was "Standard Taper for Pinions: The adoption as a standard taper for pinions, the proportion of one-and-one-fourth inches in diameter to one foot in length."

Mr. Evans said in regard to the tapering of pinions, he thought that it is pretty well agreed between the Westinghouse Company and the General Electric Company that the dimensions given gave a desirable taper. Mr. Storer, of the Westinghouse Company, had said that his company had not exactly adopted the stand-

ard taper. The only question that comes up in that respect is the possibility of the future adoption of the metric system, which might change the dimensions.

President Winsor remarked that the proposed taper is very close to one in ten. If it is made 1.2 in 12 inches, instead of 1.25 it would be one in ten.

In the course of some discussion on this point Mr. Evans said that the committee has no desire to express themselves in favor of either the General Electric Company or the Westinghouse Company, although the standard is the same as the General Electric Company, except that it seemed to be agreeable to the Westinghouse people that that would be a proper taper, and also from the fact that Mr. Storer, of the Westinghouse Company, did not seem to be satisfied with the taper they were using.

J. L. Davis, of the Westinghouse Company, opined that it would be better to leave the question of standard pinion or taper to the motor designers. If, he said, you standardize the axle and the axle layout, the position of the gear on the axle, and the pitch of the gear, the matter ought to rest at that. He thought the association would be mostly concerned with the adoption of a standard for the axles and the gears, and particularly the length of the bearing pin, which has been overlooked by this association and is not given in connection with the standard axle.

The motion was then carried that the question of the standard taper for pinions be referred to the committee on equipment.

The next recommendation was that the subject of standard gear ratios be continued for another year. This was passed without comment, as was also the next recommendation, which was as follows: "Specifications for Wrought-Iron Bars and Limit Gauge with Table of Sizes for Round Iron: The adoption as standard of the specifications for wrought-iron bars, as given on pages 6 and 7 of the report; also the adoption as recommended practice of the limit gauge for round iron and the table of sizes of limit gauges for round iron as given on page 8 of the report."

Mr. Davis said that as he understood it, both the General Electric Company and the Westinghouse Company have adopted the association's standard axles, and have built and designed their motors accordingly. Of course, the companies thought that the American Street and Interurban Railway Association would immediately conform to these standards wherever they possibly could. Much to their annoyance and expense they found that in nearly every case where they have brought these motors so designed to the operating men they have in almost every instance required some change. The consequent expense coming on the manufacturers in the end must revert against the consumer. The American Association should adhere more closely to these standards. The manufacturers have met the association more than half way, not only in fixing the standards, but also in adapting the motor design so as to meet them, and therefore they feel that the association ought to meet them half way. It was to be hoped that the association will stick more closely to these standard axle layouts, because the manufacturers were prepared to furnish motors designed along these standard lines.

The next recommendations, "iron for brake riggings," and "specifications for wrought-iron bars," page 6 of the report, were referred to the executive committee.

With regard to the specifications for rubber-covered wire, President Winsor said that the recommendation of the committee on power distribution favors the adoption of the standard specifications adopted by the Railway Signal Association as suitable for the recommendation of this association, which would pass that subject over to the power distribution committee.

The next recommendation was as follows: "Your committee would further recommend that the adoption of standards be by letter ballot, as given on pages 10 and 11 of the report, and also that the necessary changes in the constitution and by-laws be made, subject to the approval of the executive committee."

After much discussion on the question of substituting a method of one vote per million car miles (objected to) for one vote per member (as hitherto), a motion by Mr. Winsor to refer the subject of approval of standards to the incoming executive committee was carried.

The recommendations that the reprinting of the standards and recommended practices be embodied in the annual report of the association, and that a reprint of all the standards, recommended practices and specifications that have been adopted up to the time of each convention, together with proper notations as to the time adopted with any additions or alterations made, be embodied with each annual report of the American Street and Interurban Railway Engineering association as an appendix, were approved.

A communication from A. A. Stevenson, of the Standard Steel Works Company, was read at this point in which it was recommended that the manufacturers should be represented on the Standard's committee. This was referred to the executive committee.

The next paper was the report on power distribution. Mr. Heywood, the chairman, made a few remarks before taking this up.

The committee's report is divided into the following classifications:

Feeders—(1) high tension; (2) low tension.

Working conductors—(1) ordinary trolley; (2) third rail; (3) catenary; (4) underground trolley; (5) contact system.

Return system—(1) bonds; (2) supplementary copper.

Conduit system—(1) duct and conduit construction; (2) manholes; (3) ventilation and drainage.

For high-tension underground feeders from 11,000 to 13,200 seems to be the most popular range of voltage. An appendix gives the specification for purchasing high-tension underground cables. The committee recommends that in general cables be made large enough to accommodate future needs. The majority of later installations have been made with paper insulation. Rubber and cambric are sometimes used for high-tension underground cables, and if it is desired to use rubber a specification is given to be used to determine the quantity of rubber compound. High-tension cables should be protected outside the lead where they pass through manholes, the common practice being to cover the lead with woven asbestos saturated with a solution of silicate of soda. This solution should be omitted in manholes full of water. With overhead high-tension construction, the committee recommends steel supports in the form of towers where the line is isolated. When along the tracks the circuits are to be supported from extensions to poles that support trolley wires. For low-tension underground circuits the committee recommends the use of paper-insulated and lead-covered cable. For overhead low-tension cables triple waterproof braid provides sufficient insulation. For working conductors with the ordinary trolley the committee believes that for roads with frequent service 211,600 circular-mil wire should be used, preferably of the grooved section. The committee favors the use of under-the-fish-plate bonds for T-rail construction, and suggests the redesigning of standard fish-plates with a view to giving more room for bonding.

In the course of a discussion which arose, Mr. Heywood remarked that the proposed table of gauges for copper wires is the B. & S. gauge correct to three significant places of decimals only, as the manufacturers do not care as a rule to draw wire to a diameter more exact than given by the three figures.

Other recommendations were also discussed.

H. H. Stannard, of the New York Pole Company, then took up the matter of reinforced poles. He said that the amount of steel necessary to reinforce a pole is not so great as to be prohibitive. He did not

know, furthermore, of any case where the swaying of the pole had loosened the bond between the concrete and the metal. Again, in his experience his company had to take off but one or two span wires in the thousands of poles it had reinforced. The method adopted by his company is simply to take out the plug at the top of the pole and insert a steel cage with sufficient steel in it to reinforce the pole. Mr. Stannard also took exception to other details in the report.

Martin Schreiber, Engineer of Way to the Public Service Railway, Newark, N. J., then gave an interesting talk on the open-tank treatment of poles.

F. E. Case, of the General Electric Company, heartily endorsed the suggestion of the committee which favored the use of under-the-fishplate bonds for T-rails as well as for girder rails. He proposed, however, that the committee should take action to see that the fishplates are designed to give a greater amount of clearance.

Mr. Heywood moved that the bond matter be referred to the Executive Committee. This motion was carried.

Mr. Heywood said that as regards the subject of testing line material, the committee started out with the object in view of trying to arrive at standards for some of the classes of line material. The object was to arrive at a fair average from which standards could be derived. The manufacturers represented in these tabulations of tests were given numbers, there was no intention to show which manufacturer supplied the best sample, and that next year the committee could probably take from the results of these tests enough data to start the standardizing of line materials.

E. J. Dunne, Superintendent of Distribution, Public Service Railway, Newark, N. J., then gave a most interesting talk on the methods of installation of standard iron poles. This gave rise to a discussion and other gentlemen present gave, in some detail, their experiences on the matter.

A motion was then made by Mr. Matthews that the committee on power distribution take up the question of standardizing overhead material. The motion was carried.

Mr. Matthews said that in Denver his company had about 400 crossings of high-tension lines, and that cradles are used in nearly all these cases. He had heard that this matter is going to be taken up by the Board of Underwriters.

After some further discussion it was moved that the discussion be carried, and that the report of the committee be accepted. Both motions were carried.

The subject of the joint use of poles was then taken up, and a motion by W. J. Harvie to the effect that the executive committee be requested to appoint a committee to consider this subject, was carried.

THURSDAY AFTERNOON SESSION.

The Engineering Association reassembled for its final session at 2:30 o'clock.

The first business was the report of the joint committee on shop accounting, which was appointed last year to consult with a similar committee of the Accountants' Association to take up the question of shop accounts, the idea being to see what the operating men wanted in the form of shop accounts and to get the accountants to formulate such accounts. The secretary read the report presented by W. G. Gove, of Brooklyn, chairman, to the effect that the committee had held a meeting on April 14, 1909, and had a preliminary discussion of the work involved, but that no definite results had yet been accomplished. The committee was continued.

President Winsor then called for consideration of the Question Box. Much work had been done on this by the secretary and a great amount of very useful material compiled. It was ordered to be accepted and to be spread on the minutes with the thanks of the association to the secretary.

Resolutions were adopted thanking the parent association for its co-operation with the Engineering Association, the Manufacturers' Association for its excellent exhibits, and the local committee and other bodies for the success of the convention.

The nominating committee presented the following names in its report:

President, F. H. Lincoln, assistant general manager, Philadelphia Rapid Transit Company, Philadelphia, Pa.

First vice-president, W. J. Harvie, chief engineer, Syracuse Rapid Transit Company and Utica & Mohawk Valley Railway Company, Syracuse, N. Y.

Second vice-president, E. O. Ackerman, engineer maintenance of way, Columbus Railway and Light Company, Columbus, Ohio.

Third vice-president, J. S. Doyle, superintendent of car equipment, Interborough Rapid Transit Company, New York city.

Secretary-treasurer, John W. Corning, electrical engineer, Boston Elevated Railway Company, Boston.

Executive committee: Martin Schreiber, Newark, N. J.; W. H. McAloney, Denver, Colo.; John Lindall, Boston, Mass.; Thomas Elliott, Cincinnati, Ohio.

The nominations were accepted and the secretary was authorized to cast one ballot for the nominees.

President-elect Lincoln, on being ushered to the rostrum, briefly addressed the association and thanked it for the confidence reposed in him by his election.

The convention was concluded with the unanimous passage of votes of thanks to the retiring president, Paul Winsor, and to the secretary-treasurer, J. W. Corning.

Transportation and Traffic Association.

MONDAY SESSION.

President C. Loomis Allen, of Utica, N. Y., called the first session of the second annual convention of the American Street and Interurban Railway Transportation and Traffic Association to order at the Auditorium at 2:45 o'clock Monday afternoon.

John A. Beeler, vice-president and general manager of the Denver City Tramway Company, welcomed the members to Denver and pointed out some of the interesting things about that city. President Allen then read his presidential address:

President Allen said that at the close of the 1908 convention, held in Atlantic City, it was the firm conviction of the officers and executive committee of this association that the work during this year should be wholly confined to the standing committees, and that the sessions of the 1909 convention would be devoted to the consideration of the reports submitted by these committees. The standing committees are those on passenger traffic, interurban rules, express and freight traffic, city rules, transfers and transfer information, and the training of transportation employes. The Transportation and Traffic Association was organized in January, 1908. It has not as yet accomplished or produced any one definite thing. It has not recommended the adoption of, or given the stamp of its approval upon, any of the reports of its committees. This can now be done intelligently and should be done at this convention. The adoption of the reports of the standing committees will not mean the end in these matters. The reports should be referred to the incoming standing committees for further consideration, suggestions and improvements. The work during 1910 will without doubt pro-

duce amendments which should be presented at the 1910 convention and if accepted by the association will bring the reports up to date, so that at the close of each annual convention the amended reports will reflect the best energy, thought and practice on all transportation and traffic subjects.

Secretary Bernard V. Swenson next read the annual report of the executive committee and his own annual report as secretary-treasurer.

At the request of President Allen, M. C. Brush, of Newtonville, Mass., chairman of the committee on creation of passenger traffic, took the chair and presented the committee's report. Mr. Brush said in part:

At the convention held at Atlantic City in October, 1908, the committee on passenger traffic submitted a lengthy report on the methods of procedure by various electric railroads throughout the United States for creating traffic, laying particular stress upon the methods pursued and results obtained in connection with the operation of parks or pleasure resorts. At the time of securing that report efforts were made to cover the ground as thoroughly as possible, and it therefore seemed wise in the report of the committee for this year to endeavor to lay before the association examples of means adopted by electric railway companies throughout the United States, in calling to the attention of the public features which would result in increased traffic. The committee was reluctant to forward a circular letter to all the member companies for this information, and therefore the greater portion of the United States was divided into arbitrary divisions, governed to a certain degree by the homes of the respective members of the committee, and each member endeavored to secure from his territory a comprehensive assortment of all kinds of printed matter, such as folders, flyers, time-tables, pamphlets, postal cards, etc., referring to the matter in hand. The committee was successful in securing printed matter from 117 companies, varying in number from one to twelve classes of printed matter, making a total of 278 different samples submitted. These the committee has endeavored to carefully arrange and have on exhibition in the convention hall. It will unquestionably be surprising to some members of the association to note the tremendous amount and variety of this matter being published, particularly when it is realized that it is but a few years since any effort along these lines was inaugurated. The committee believed that the best results from its report could be secured by requesting a discussion of the relative merits of the different classes of printed matter.

Chairman Brush then called upon E. F. Peck, of Schenectady, N. Y., as a member of the committee, to give his views.

Mr. Peck said that judicious advertising for the creation of passenger traffic is a very serious problem. All railroads appreciate the fact that they must advertise; in the case of the interurban roads, first by issuing time-tables. Newspaper advertising they all must have. Mr. Peck believes it is necessary for every company to publish its time-tables in the local newspapers, and to call attention to important features, such as excursions, on their roads. The other class of advertising is the folder. Some of the folders are merely time-tables, others are devoted to scenic places on the lines of the interurban roads. His own experience has been that if a large amount of money is to be spent in advertising of that nature the very best is none too good.

F. W. Coen related the methods of advertising in use in the central territory, and asserted that the folder and time-table are considered the most profitable. He also favored the pictorial map for advertising purposes.

H. C. Page, of Springfield and Worcester, Mass., said that he is a thorough believer in advertising. A person would not think of conducting a business of any magnitude, any other line of business, without advertising that business, unless he had a monopoly and were manufacturing an article that people were compelled to buy out of necessity. Railroads have something to sell in the way of a ride, and there is a lot of business to be secured by advertising in a reasonable and intelligent way. He claimed that the newspaper of today is something that the traction manager has to reckon with—the newspapers are alive to the pulse of the people, they are very quick to catch on to the way in which the current of public opinion is drifting, and unless traction companies are doing business with them and recognize them they are liable to lose business.

Chairman Brush then requested that some member of the association give some information in regard to the amount of money spent for advertising literature of different character.

F. D. Hunt, of Portland, Ore., said that his company was greatly interested in the handling of passenger traffic this year, especially in view of the fact of the Seattle Exposition, and during the early part of the year prepared a pictorial folder and ordered 20,000 copies, which cost $850. They found that the supply was exhausted long before the Fair was really started, and ordered 10,000 copies more. The result has been very beneficial. Another good plan of advertising was to string banners across the intersecting streets where a great number of people pass each day, calling attention to any special excursion which is going out on the interurban line. Also to carry an advertisement on the front end of the cars announcing any particular attraction.

P. P. Crafts, of Clinton, Iowa, said that from the standpoint of a small interurban road, they have allowed an annual expenditure of approximately $4,000 for advertising and conducting pleasure parties. Of that sum approximately $1,000 is appropriated out of the receipts, for making up losses on the park, which is more than amply covered, of course, by the returns from the tickets sold on the cars.

J. W. Brown, of Connellsville, Pa., said that the traction company in Connellsville has an advertising expenditure of about $10,000 a year. It issues time-tables, which cost about $8 a thousand. Blotters are also used—the ordinary hotel blotter, in bright colors, with the schedule of the particular cars, the line of cars, running into that town. That catches the traveling man when he reads his letters, and is getting ready for his next day's route—he has the schedule in front of him in black type. These cost about $3 a thousand. They also use a wall schedule for the interurban lines, about eleven by eighteen inches; these cost about $3 per hundred.

T. C. Cherry, of Utica, said that it seemed to be the consensus of opinion that pictorial literature, time-tables, etc., is a good scheme of advertising, but it seems that traction companies should go further than that, and a good deal of this work is up to the passenger agent. He said that if the literature is well distributed, so far so good; but thought that this work should be followed up by the passenger agent.

J. H. Pardee, of New York, stated that there are two classes of people to be reached by advertising, one class is composed of those who know about the road and know where it goes to, and must be induced to ride more, and there is another class which is composed of those who do not know the road, are not familiar with it, and would not ride on it unless they were informed that there is such a road, where it goes to, and a different kind of advertising is needed to reach this class of people. For the latter class a plan which brought good results at very little expense was to mail under personal cover to each one of the ticket agents of the steam railroads in their vicinity a complete time-table and folder, and thus the ticket agents were able to give this information to travelers and people not familiar with the electric road.

W. H. Collins said that a large part of their traffic is derived from hauling people to pleasure resorts, and a traveling passenger agent looks particularly after that kind of business. It is his duty to go around through the surrounding country, to a distance even as great as a hundred miles, and book picnics. But to catch the popular travel, a great deal of poster advertising is done.

J. C. Calisch said the conditions of his road are rather peculiar, in that they have local suburban and interurban trolley travel, steam railroad and steamboat. They found on the whole that for the general information of the public a folder was best, and they distributed them very thoroughly over the entire system. In fact they put out 50,000 of them, and they cost $2,500. They also got out a fan, which was very popular, and for which the office received a great many calls.

F. W. Coen said there is another side of the advertising business which it seems to have been lost sight of. A pleased patron is the best advertising medium. Mr. Coen then cited a case where his road transported a picnic which the steam road had disappointed, and claimed that those people were now doing more for them than any printed advertisements.

Ernest Gonzenbach said that his road owned a summer resort which is a favorite one-day outing, and they found that cer-

tain cars during the day were heavily overcrowded, while other cars during the day were underloaded, so they started an advertising campaign this summer instructing the public as to when to take cars and how to avoid the crowded cars. It was found very profitable.

A. H. McKay said that conditions have a great deal to do with the amount of advertising one is called upon to use. If traction companies have parks or summer resorts or anything which they want the public notice called to, Mr. McKay was strongly in favor of advertising.

Mr. Dozie related a scheme which proved to be a good advertising proposition. His road gave a free clam-bake at the terminal of his road to advertise their route. This did a great deal toward familiarizing the public with the pleasures derived from a trolley trip.

C. Loomis Allen, of Utica, said that he belongs to that class of men which is doubtful about the wisdom of distributing large sums of money in advertising for the sake of increasing passenger traffic. The gross earnings of the electric railways are approximately $3,000,000 per annum. His road spent last year in twenty-eight papers scattered over a territory of seventy-five miles, advertising time-tables giving the leaving and arriving time of electric trains, $2,800. The first day of June, 1908, they inaugurated a limited service which was in direct competition as to running time with the main line of the New York Central. The only method of advertising this line successfully was to have time-tables distributed in homes along the route.

R. P. Stevens said that his road does almost all kinds of advertising, but in particular the line which he had the figures on is the Liberty Bell route, which caters to the Delaware Water Gap travel from Philadelphia to the Delaware Water Gap mountain resorts. Although this business is not nearly as large in winter as it is in summer, it is to a certain extent all the year around business. This year they appropriated $3,000 for advertising in the Philadelphia papers, for the reason that they did not think they could turn out the time-table and distribute it promiscuously. He related a number of expenditures that were to be made for advertising purposes —the largest being for an attractive folder advertising a special trip.

Chairman Brush called attention to one folder sent to the committee, reading, "Free Trips to Evansville and Return Every Day in the Year." On the back of it was the following: "The following merchants, all the members of the Evansville Rebate Association, have combined, and under their plan your fares will be refunded on your purchases. Particulars at every store." Regardless of the amount of folders issued, Mr. Brush still felt that unless service was given that could be depended upon absolutely, the money spent on folders was wasted.

President Allen then took the chair and the meeting was adjourned until Tuesday morning.

TUESDAY SESSION.

The second meeting was called to order at 10 a. m. by President Allen, who asked C. D. Emmons to read the report of the committee on interurban rules.

Acting in conformity with the resolution passed at the last convention the committee sent to every electric-railway company in this country and Canada a copy of the code of rules as submitted to the 1908 convention asking that they make such criticism and suggestions as to changes in the code submitted as their experience dictated. Many of the replies contained criticism that was very helpful to the committee. At several meetings the code has been discussed in great detail and a number of important changes recommended. After an experience with the coded form extending over several years, it is the belief of the committee that it is wise to refer to the practice outlined in the American Railway Association code of rules as nearly as possible. With this idea in mind, several changes have been made in the code. Two forms of train orders, 19 and 31, have been adopted and the code form dropped; rules 203, 230 and 261 have been changed and rule 203A added, outlining conditions when a train may proceed, preceded by a flag.

This report was considered in sections. When the question of time-tables came up, C. A. Coolidge, of Portland, Ore., said that Rule 84, regarding the "Supersedure of Time Tables," is a rule which has been discarded by the American Railway Association. The conditions affecting the operation of a great many of the Western roads are such that they are required to operate under the latter rules for a good many reasons, one of which is that trainmen from the standard steam roads can be put to work on the interurbans and be at once familiar with the rules. Under the proposed code of rules a steam man would be absolutely lost.

Mr. Emmons declared that the American Railway rules on time-tables and the corresponding rules of his committee show that there is not a great variance.

Mr. Coolidge, however, moved that Rules 84 and 85 of the proposed code be amended by the substitution of Rule 4 of the Standard Code of Train Rules of the American Railway Association.

W. R. W. Griffin, of Rochester, N. Y., offered an amendment to that motion, to the effect that the latter rule be adopted in the code as an optional rule. Then followed a discussion in which J. D. Wardle, Cedar Rapids, Ia.; C. L. Henry, Indianapolis, Ind., and Messrs. Emmons, Coolidge and Griffin participated. Upon final vote, however, the entire amendment was lost.

F. A. Boutelle, Tacoma, Wash., protested against the explanation given of "Protected by Flag," viz., that "trains will be operated under control within one-half of the range of vision on straight track," asserting that this was not a safe practice for high-speed roads, as it gives the trainmen too much discretion. He later submitted his ideas in the form of an amendment, which failed of adoption, however.

P. P. Crafts, of Clinton, Ia., submitted an amendment to Rule 219, which relates to the protection of trains when stopped on the main line between stations. This rule, as it is given in the report of the committee, is practically the same as the American Railway Association rule, but in his opinion did not state the proper signals nor the procedure to be followed by the flagman in any way. In the amendment that he submitted these details were specified, and incidentally the conductor was ordered to go back 1500 feet with stop signals. These rules were the ones used by the Chicago & Northwestern Railway and accounted partly for its freedom from serious accidents.

William B. Rockwell said that this distance is unnecessarily long, and it puts a burden on the employe that he never carries out. A man can see on a straight track a danger signal far enough ahead to enable him to stop his train.

Mr. Griffin declared that these rules should be formed so that they can be applied in general to any road. The individual operating rules can be made to suit the conditions on any individual road. If it desires, a road can put on added protection, and that does not take the general rule from the standard code of rules. The question was also discussed by President Allen, C. D. Emmons and S. W. Cantrell, of Denver.

On a final vote the amendment offered by Mr. Crafts was lost.

C. E. Morgan, Crawfordsville, Ind., moved that Rule 212 be eliminated, as he claimed that Rule 213 covers the same thing. After some discussion this amendment was lost.

Chas. R. Henry, of Indianapolis, discussed Rule 256, which provides that the dispatcher telephones his order to the motorman, who writes it on a blank, with sufficient carbon copies for each member of the crew, and when he has finished writing the order he reads it to the dispatcher, who will O. K. the same if correct. The motorman thereupon signs his name upon the order. The conductor then reads the order to the dispatcher, and, if correct, the latter completes the order by giving the initials of the superintendent, or other designated authority, and the time of completion. He moved that there be eliminated from this rule the provision that the conductor shall read the order back to the dispatcher. In Indiana in getting up the rules with the State Railroad Commission it was decided that that part of the rule should be optional to each company. One road in that state adopted that portion of the rule, but the rest believed it ample if the conductor takes the order and the motorman reads it carefully. The committee has reported it differently here, but he supposed they are probably ready to justify it, or at least some of them are.

Mr. Emmons asserted that he was proud to say that his was that one road in Indiana that is using the double order. It is the only way to be absolutely sure that both men get the order and that they fully understand it. The dispatcher has instructions absolutely to refuse to complete

an order until he gets the second voice over the telephone. The objection about the time that it takes is not very serious.

F. W. Coen, of Cleveland, declared it had always been his idea that the train order should be received by the conductor. The place for the motorman is on his car, where he should stay.

Mr. Griffin said every time a movement other than as provided by the time-table is made, it enters into danger. Any dispatcher's order is a dangerous procedure, no matter what it is, and cannot be hedged around with enough safeguards.

J. C. Calisch, of Buffalo, said he would rather take a chance on the message being repeated by the second man to the dispatcher to know that it is on record there, than to take the chance that the motorman has read it back to the conductor.

S. W. Cantril, of Denver, Colo., said he was opposed to a divided responsibility between the motorman and the conductor. He preferred to have the motorman deal with the dispatcher.

After further discussion by Messrs. Wardle and Brush, H. A. Nicholl read a letter from J. N. Shannahan, chairman of the committee, who said he had changed his mind about the matter since the committee's report was printed. He therefore submitted an amendment similar to that of Mr. Henry.

On a vote the amendment was lost. Mr. Henry then moved that his amendment be inserted in the rules as an optional practice, thus leaving it to the companies to decide whether they shall have orders repeated back twice or only once. After some discussion of the propriety of such action it was adopted.

As scarcely any other amendments to the remaining rules through No. 446 were submitted, and as over two hours had been consumed in the detailed discussion of all these rules by groups, the question of the adoption of the entire code was brought up. In this connection J. H. Pardee submitted the following resolutions:

Whereas, The committee appointed at the last meeting of this association has prepared and reported a certain code or set of rules governing the operation of electric interurban cars, which code is intended to include such general rules as represent the best and most modern practice in electric-railway operation, and

Whereas, This association has duly and carefully considered and amended the same in some particulars, and

Whereas, It is for the interest of the members of this association that the association adopt, approve, promulgate and recommend a code of rules which shall be considered the standard code, except in so far as it may, in specific instances, be necessary to omit, add to or change rules in order to conform to state or municipal laws and regulations or to local conditions;

Now therefore be it resolved, That the rules reported by the committee, and as changed, omitted or amended at this meeting, be the standard code of rules of this association for the operation of interurban cars, until such rules may be duly amended or changed at a meeting of this association, and

That this association request its members to adopt this standard code of rules for the operation of interurban cars on their respective railways except in so far as such rules may conflict with state or municipal laws or regulations or be unwise or inapplicable on account of local conditions, and

That the committee on interurban rules be continued to report at the next meeting of the association such proposed changes or amendments as may seem wise or necessary.

C. A. Coolidge, of Portland, Ore., moved as an amendment that the standard code of train rules of the American Railway Association be submitted for the code as proposed. The motion of Mr. Coolidge elicited a spirited discussion, in which C. J. Franklin, of Portland, Ore., and F. A. Boutelle, of Tacoma, Wash., sided with him in declaring that the northwestern roads could use the American Railway Association's rules only. The committee's code was defended by Mr. Pardee, C. F. Henry, D. A. Hegarty, F. W. Coen and President Allen. These gentlemen asserted that under the resolutions proposed a road might use the American Railway Association rules, if it found local conditions required this. Only three votes were cast in favor of Mr. Coolidge's amendment.

The resolution as offered by Mr. Pardee was then carried by an almost unanimous vote.

Mr. Coolidge then moved that the committee on interurban rules confer with the corresponding committee of the American Railway Association as to changes desirable in either code of rules. After some discussion relative to the form of this motion it was adopted unanimously.

WEDNESDAY SESSION.

The association was called to order at 9:50 a. m. by President C. Loomis Allen, who announced the appointment of the following committees: Committee on nominations: E. F. Peck, F. I. Fuller and H. A. Nicholl. Committee on resolutions: P. P. Crafts, J. H. Pardee and H. W. Blake.

President Allen then called upon Mr. Crafts to read the report of the committee on express and freight traffic.

The report of the committee shows in tabulated form the amount of business, both freight and passenger, carried on by thirty-nine electric roads, which responded to the request of the committee. A significant point in the report is the rate at which the freight revenue of the roads has increased. It pointed out that steam roads were built with the primary intention of handling freight, and interurban roads, in the past, for handling passenger traffic almost exclusively. Now, however, electric railroads are being financed on that basis that a considerable percentage of their earnings shall be obtained from freight traffic. Among the important recommendations emphasized by the report were the following: Traction companies should pay more attention to the matter of solicitation of freight traffic; many companies provide for too elaborate freight facilities without first being assured of the business; the committee recommended that some action be taken to prescribe a standard method of freight and express accounting. The committee also recommended that companies adopt a standard bills of lading, waybills, expense bills, etc., and also that careful attention be paid to the handling of all claims.

The discussion was opened by F. J. Hanlon, of Mason City, Ia., who said he thought that they were the first road to handle freight in connection with steam road, and also the first ones to have through tariffs in connection with them. All of their freight rates are based on the same rate that the paralleling steam line charges. On passenger fares they are higher than the steam rate. For instance, between Mason City and Clear Lake, the Chicago, Milwaukee & St. Paul steam rate is nineteen cents, their rate is twenty-five cents.

H. A. Nicholl said that about ten per cent of their gross earnings came from their freight and express business. They have separate terminals in some of the larger cities, and in the smaller ones have a combined freight and passenger agent. They do considerable advertising of the freight business, get out a special magazine every three months, devoted to the subject of express and freight. This company is doing only a state business, not an interstate business. In the larger cities where they have the separate freight terminals, they, of course, have sidetracks as well. He said his company did not solicit a great deal of carload business except it be live stock, and did not attempt to handle coal or lumber or things of that character.

Mr. Hanlon discussed the possibility of determining the actual operating expenses of the freight car movement and thought it would be difficult to do this accurately.

Mr. Crafts said that in charging the freight department with track expenses they figure up the entire track overhead maintenance at so much per car-mile, including freight and express. On single cars, regardless of whether they are trolleys, motors or freight cars, then they charge the freight department with its proportion in accordance with the mileage operated, and in the particular case in charging power they know how much the power costs.

Mr. Todd said that the Brooklyn Rapid Transit Company has figured out the charge of fourteen cents to cover the maintenance of track and repair and maintenance of overhead wires in power consumption.

Mr. Hanlon was of the opinion that a freight car would not do more damage to the track than the average heavy in-

terurban car, and mainly on account of the speed.

A. H. MacKay said that their line is a short system running between Tacoma and Seattle, a distance of about forty miles. The earnings at the present time per month have run from $12,000 to $14,000. They handle on that road three-car passenger trains, frequently with two-car second sections, with some short hauls between. Considerable freight traffic is necessary, however, to have the earnings total that amount. They handle from 3,500 to 4,000 gallons of milk every morning. They also handle refrigerator cars over the line, that are built especially for service between the two cities. In handling beef, all of the packing houses are fitted with tramway appliances, as are the cars, which operate right from the cold-storage room into the cars, so that it is possible to handle the meat directly from the cold-storage houses and load it into the cars, without the hooks being taken off from the wires, and the same is true at the unloading stations. There is nothing that steam roads handle that they do not handle—lumber, coal, all kinds of merchandise, all kinds of heavy material; they handle anything except live stock.

F. A. Boutelle said that in addition to the freight business mentioned by Mr. MacKay, the company was handling from fifteen to thirty cars of coal per day, from Renton. They have forty standard fifty and sixty thousand-pound capacity cars which they furnish, and the Seattle Electric Company furnishes fifteen or twenty in addition, and the coal business averages from fifteen to thirty cars per day between Renton and Seattle.

President Allen, in discussing the difficulty of arriving at a proper charge against freight cars, quoted an incident of a southern road which wants to finance some of its securities. The earnings of the road were apparently large, but upon investigation it was found that the company was loading gravel into the cars, at a gravel pit along the line and depositing it along the roadbed. The earnings, however, were charged up at the full rate. Mr. Allen said the difficulty of determining the cost of freight operation was not confined to the electric roads, but was also just as serious with the steam roads.

George W. Parker, of Detroit, said he had an opportunity to raise the rate on a certain community, with the result that he had to appear before the railroad commission of the state of Michigan. The opposing counsel took the ground that the handling of freight and express on electric cars should be done much cheaper than with steam roads. Mr. Parker had to contend the other way, and not only contend, but produce facts that would bear out that contention. Fortunately, in order to arrive at the consuming of power some months ago the road took up the question of handling coal a distance of twenty-eight miles to the power house. The difference in rate from the mines to the power house in comparison with the steam roads was twenty-five cents in favor of the electric, with the result that they were making ten cents a ton. A power test of car consumption was made, with the result that they are getting that coal over the steam road and paying the railroad extra compensation for taking care of it up to the power-house destination.

Mr. Cooper said that for the last six years his road in Galveston has been reconstructing the line, and it has been necessary to keep a motor car and five double-truck trailers merely for the construction work. They have been trying to get at the cost of the operating of those, and operate them sometimes twelve to eighteen hours a day steadily all the year round. They have been absolutely unable as yet to determine on any basis as to what the operating cost was.

Mr. Fuller said that they had purchased a road which had a freight and passenger line about forty miles long and another one sixteen, which does a regular freight business. They have about 140 freight cars, and handle a great deal of timber, sawed lumber and logs, as well as general merchandise and agricultural products. The cost between the freight and passenger business was divided on a car-mile basis, and he thought that a fair arrangement. The passenger cars run faster than the freight cars, and possibly average a little lighter. On this basis the freight operating expenses amounted to about sixty per cent.

President Allen then asked for the report of the committee on city rules. In the absence of the chairman of that committee, the report was submitted by D. A. Hegarty, of Little Rock, Ark.

Mr. Fuller, of Portland, read a communication which was addressed to the committee on city rules.

The phraseology of a number of the rules has been changed in an effort to make them more clear and definite, but the general intent of the rules as adopted in 1907 has been preserved. The growing use of the "pay-as-you-enter" types of cars introduces new conditions of operation, and the committee recommends that a standard code of rules governing the operation of such cars be prepared and submitted to the association for consideration and adoption.

President Allen then said that, with the permission of the delegates, he would rule that amendments relating only to grammatical or typographical errors of the rules would not be considered in the discussion, but that they should be submitted to the 1910 committee for their consideration. The rules would be considered in sections, and amendments to them should be presented in writing.

The rules were considered in this way and with a few changes here and there the report was adopted.

THURSDAY SESSION.

The last meeting of the Transportation and Traffic Association was called to order by President Allen at 10 a. m. Thursday. The consideration of the report of the committee on city rules was resumed at Rule 201. The remaining city rules were adopted with only slight changes.

H. S. Cooper, of Galveston, then offered a set of resolutions, similar to the ones passed at the Tuesday session, relative to the interurban rules, adopting as a standard code of city rules the committee's report as amended. These resolutions were unanimously adopted.

A paper on "Chicago's Transfer Crusade," written by Joseph V. Sullivan, of the Chicago Railways Company, was then read by Mr. Brush.

In this paper Mr. Sullivan pointed out the difficulties encountered in Chicago in combating the former general misuse of the transfer privileges, and the practice adopted by his company to stop the evil. Chicago has probably the largest number of transfer points of any city in the world. About 41.03 per cent of the total passengers carried last fiscal year were transfer passengers. An extensive traffic in transfers had sprung up at transfer points all over the city. A city ordinance was passed which forbade this practice. Under it very numerous arrests of transfer vendors were made and the prosecutions successfully pushed. By humane treatment of the offenders the crusade overcame the unpopularity it had to contend with at first. By warnings displayed in the cars and printed on the transfers the public was educated to the proper viewpoint and in about a year the transfer abuse had been practically wiped out.

C. C. Learned, of Boston, opened the discussion by narrating the similar circumstances in Boston, where the misuse of transfers has caused a considerable loss. A law was enacted which was not as broad as the one in force in Chicago. This law does not make it an offense to give away a transfer or solicit one, but

makes it an offense to offer the same for use. It was necessary to get absolutely conclusive evidence and the prosecutions, therefore, were not as numerous. However, the abuse has been almost entirely stopped.

M. C. Brush, of Buffalo, spoke of his experience with the transfer question. An extra cent is charged for the issuance of a transfer. Some difficulty was at first experienced in making the conductors give a proper accounting, but a system of checks had been instituted, which put a stop to their exchange of transfers at junction points.

C. D. Emmons, of Fort Wayne, Ind., outlined the manner in which the transfer abuse was diminished by insisting that passengers transfer only at branching points and not at the old transfer center of Fort Wayne.

R. I. Todd, of Indianapolis, and S. W. Cantrell, of Denver, also discussed the subject.

J. W. Brown was then called on to read the report of the committee on training of transportation employes.

This is the second annual report of this committee. The operation of electric railways throughout the country during the year has emphasized the necessity of more thorough training of the transportation employe. The need of a more intelligent class of men is apparently due to the increased speed at which cars are operated, the increased complication of equipment and the increased number of cars which are moved against each other, together with the ever-swelling traffic density as the territory adjacent to the various lines becomes more closely built up. It is of the utmost importance that the physical condition of the men be determined, together with the sight, hearing and color perception, and that this information be made a matter of record. The matter of making more dignified the calling of motormen and conductors is one of the best ways of attracting to the service men of higher mental and moral standards. Too much care cannot be exercised in instructing men who come in contact with the public of the obligations to the patrons of the road. The old adage, "A man is known by the company he keeps," is reversed, and it is now stated that "A company is known by the man it keeps." The giving of both oral and written examinations has considerable value from the fact that, while many first-class employes do not have the power of expression in a very great degree, it encourages them to further self-education and is a step toward putting the service on a higher level. As far as discipline is concerned, no matter what form of discipline be used, there should be greater attention paid to the education of the men and the discipline meted out accordingly. It does not seem right and just to attempt to educate a man into the duty of trainman in a few days and then treat him in discipline with the full merits or demerits of the case as though he were an experienced employe. The value of the pension system is not only in the benefits which accrue to the employe, but also is a means of directly benefiting the company. The sober, thinking class of men are loath to leave the service of the company which assures them support in their old age. There is also that question of moral responsibility, if not legal responsibility, to the employe who has given the best years of his life to the service.

C. B. Wells, of Denver, submitted a written communication, in which he described the rigid entrance requirements exacted by the Denver City Tramway Company. A course of instruction is given the new men on the equipment placed in their charge and the duties of their position. The Brown merit and demerit system had been tried in enforcing discipline, but it incurred the ill-will of the employes and had to be partly abandoned.

N. W. V. Bolen, of Newark, also submitted his discussion in writing. He advised superintendents and their immediate subordinates to become personally acquainted with their men for the purpose of studying their work. He also advocated the use of a good "follow-up" system.

C. C. Learned described the practice in use in Boston of paying ten cents a day bonus the year round to instructors, which increased the desire of the men to advance to this rank. His company employed from 1,500 to 2,000 new men a year and had found its system of instruction to give excellent results.

W. R. W. Griffin, of Rochester, N. Y., spoke of the recommendations of the committee of last year to adopt standard forms, blanks and methods whereby the different companies could quickly get information in regard to the men who leave the employ of one company and enter that of another in a different city. One of the greatest difficulties has been in trying to find out about a man from the other companies that previously employed him.

C. J. Franklin, of Portland, Ore., said his company had found the merit and demerit system to give very satisfactory results for the claim department. It was desirable to be very generous in giving merits to the men, more particularly when good accident reports are made out, and when they secure a larger number of witnesses than are required, and for many other things relating to the claim department in which they figure.

The subject was also discussed by Dana Stevens, of Cincinnati, and P. P. Crafts, of Clinton, Ia., who outlined in detail the methods of instruction and discipline employed on their respective lines. On the latter system the men are taught to fill the positions both of motorman and conductor.

On President Allen's motion the Atlantic City convention report of the committee on the training of employes, which had not been adopted last year, was now adopted with its appendixes giving standard forms. The part of the 1909 report referring to methods of discipline was referred back to the committee for further consideration for the 1910 report, on account of differences of opinion on this topic.

President Allen then appointed a committee composed of Messrs. Emmons, Brown and Hegarty to present to the American Association in the afternoon a report of the work done by the Transportation and Traffic Association and to request the parent association to ratify the adoption of the various codes of rules, in order to make them stand as the act of the association.

The nominating committee submitted the following nominations:

President, Robert I. Todd, vice-president and general manager, Indianapolis Traction and Terminal Company, Indianapolis, Ind.

First vice-president, Henry C. Page, general manager, Springfield Street Railway Company, Springfield, Mass.

Second vice-president, N. W. Bolen, superintendent of transportation, Public Service Railway Company, Newark, N. J.

Third vice-president, George Whitfield Parker, general express and freight agent, Detroit United Railway Company, Detroit, Mich.

Executive committee: J. N. Shannahan, Baltimore, Md.; Dana Stevens, Cincinnati, Ohio; J. W. Brown, Connellsville, Pa.; A. H. Mackay, Tacoma, Wash.

The secretary was instructed to cast the unanimous vote of the association for these nominees as the officers for the forthcoming year, and they were duly declared elected. President-elect Todd made a brief address, thanking the association for the honor conferred on him.

Resolutions were then passed thanking all those responsible for the success of the convention. After this the convention adjourned.

Claim Agents' Association.

The sessions of the Claim Agents' Association were held at the Metropole Hotel on the morning and afternoon of Monday, the morning and afternoon of Tuesday, and the morning of Wednesday. The business of these sessions included the address of the president, the reports of the executive committee, secretary-treasurer, and the appointment of convention committees. Special discussion was had

upon the best means to prevent collision of cars and of cars with vehicles and pedestrians, the diminishing or elimination of boarding and alighting accidents, the best plan for having trainmen procure and report an increased number of witnesses to accidents, the advisability of furnishing an injured party with a copy of his statement concerning the accident, the question as to whether a school of instruction for trainmen is essential, the advisability of furnishing newspapers with information concerning the work of the claim department, the relationship of the medical and claim departments, and the extent to which the medical department can best serve the claim department in the handling of accidents; and the relation of the claim department to the operating department.

The following officers were elected for the ensuing year:

President, E. C. Carpenter, claim adjuster, Indiana Union Traction, Anderson, Ind.

First vice-president, J. S. Harrison, claim agent, Jacksonville (Fla.) Electric Company.

Second vice-president, J. Handlon, general claim agent, United Railroads of San Francisco.

Third vice-president, H. K. Bennett, claim agent, Fitchburg & Leominster Street Railway, Fitchburg, Mass.

Secretary and treasurer, B. B. Davis, claim agent, Columbus (Ohio) Railway & Light Company.

Report on Meter Tests.

At a meeting of the New York Public Service Commission the secretary presented a report on the gas and electric meters tested during the month of September. Gas meters tested during the month number 29,209, of which 5,303 were new meters; 23,715 repaired and removed meters and 191 "complaint" meters.

The tests of the "complaint" meters are summarized as follows:

Two per cent or more fast, eighty-four (forty-four per cent); two per cent or more slow, twenty-three (twelve per cent); between two per cent fast and two per cent slow, eighty-four (forty-four per cent).

The number and percentage of complaint meters correct, fast and slow were: Absolutely correct, twenty-four, per cent 12.6; fast, 112, per cent 58.6; slow, fifty-five, per cent twenty-eight.

During the month tests on twenty-eight electric meters of which complaint was made, resulted as follows: Four per cent or more fast, one (3.5 per cent); four per cent or more slow, three (10.7 per cent); between four per cent fast and four per cent slow, twenty-four (85.8 per cent).

New York Electrical Show.

The third annual New York Electrical Show, at Madison Square Garden, was opened to the public on Monday night, October 11, to continue until October 21.

The show started with all the booths and exhibits in good order and with practically all spaces occupied. The exhibits include most of the leading electrical manufacturers of the country.

The application of highly artistic effects in illumination and decorations have transformed the interior of the Garden into a pleasing and beautiful spectacle. The use of over 75,000 incandescent lamps, as well as other forms of electrical illumination in the various booths, makes a brilliant effect. The most conspicuous of the lighting effects is, in point of fact, a row of large chandeliers with varied colored lights extending down the center of the building with a row of smaller ones on either side. The booths are of a uniform style of construction and a decorative color scheme of white and gold has been followed throughout.

The application of electric current for domestic and industrial purposes is generously displayed in practical operation and shows the multiplicity of uses of electricity, in store, factory, home, office and on the farm. The demonstrations of wireless telegraphy made from one end of the building to the other, are proving a constant attraction.

A good musical programme is rendered each afternoon and evening by d'Asquin's Military Band. In effect the "Show" bids fair to surpass anything of its kind ever held in New York.

Much credit is due the management for the efficient and prompt manner in which the exhibits and all matters pertaining to the show have been taken care of. Among the booths that occupy the largest space and attract the general attention are those of the New York Edison Company, General Electric Company, Westinghouse Electric and Manufacturing Company, the Edison Electric Illuminating Company, of Brooklyn, and the United Electric Light and Power Company. A complete working model of an automatic electric push-button elevator on direct current, for private-residence use, is one of the features of the show displayed by the Otis Elevator Company in the center of the building.

The ELECTRICAL REVIEW AND WESTERN ELECTRICIAN occupies a booth prominently located just within the main entrance, where all visitors are being cordially welcomed and headquarters for out-of-town electrical men established.

The following is a complete list of the exhibitors:

American Electric Lamp Company.
American Metal Hose Company.
Automatic Electric Washer Company.
Baltimore Enamel & Novelty Company.
Charles Biele.
Consolidated Telegraph & Electric Subway Company.
Collins Wireless Telephone Company.
Como Electrical Company.
The Crane Company.
Duntley Manufacturing Company.
Dossert & Co., Inc.
Electrical World.
Electric Suction Sweeper Company.
Edison Electric Illuminating Company, of Brooklyn.
Electric Testing Laboratories.
Excello Arc Lamp Company.
ELECTRICAL REVIEW AND WESTERN ELECTRICIAN.
Electric Home Supply Company.
Electric Cleaner Company.
Empire Vacuum Company.
Economical Electric Lamp Company.
The Electric Storage Battery Company.
Fox Brothers & Company.
Feature Advertising Company.
F. L. Guirdth & Company.
Goulds Manufacturing Company.
General Vehicle Company.
General Compressed Air and Vacuum Cleaner Company.
General Electric Company.
German-American Electric Company.
Harley Machine Company.
The Heany Company.
International Correspondence School.
Keller Manufacturing Company.
H. Krantz Manufacturing Company.
C. L. Kiewert Company.
J. Livingston, Jr., & Company.
The Lansden Company.
Murphy Electricity Rectifier Company.
Manhattan Electrical Supply Company.
Moore Electrical Company.
National Electric Lamp Association.
The New York Edison Company.
New York Electrical Trade School.
Nugget Polish Company, of New York. Ltd.
Otis Elevator Company.
Public Service Corporation of New Jersey.
Pelouze Electric Heater Company.
W. P. Pressinger Company.
Radio Reflector Company.
Shelton Vibrator Company.
Stanley & Patterson.
Southern Exchange Company.
Sunray Electric Lamp Manufacturing Company.
The Storage Battery Supply Company.
Tucker Electric Construction Company.
United Shoe Repair Machine Company.
United Electric Light and Power Company.
Vacuum Engineering Company.
Watson-Stillman Company.
Westchester Appliance Company.
Roger Williams (The Simplex Electric Heating Company).
The Westinghouse Companies.
The Wonderful Pump Company.

Iowa Telephone Merger Enjcined.

The Iowa courts have enjoined the Iowa Telephone Company, a Bell concern, from absorbing the Mutual Telephone Company, of Des Moines, an independent concern, on the minority stockholders' petition. The Bell company has secured a majority of the Mutual company's stock.

THE COLORADO ELECTRIC LIGHT, POWER AND RAILWAY ASSOCIATION.

ANNUAL MEETING, DENVER, COLO., OCTOBER 7, 8 AND 9.

The annual meeting of the Colorado Electric Light, Power and Railway Association was held at the Auditorium Hotel, Denver, Colo., October 7, 8 and 9. There was a very representative gathering of electrical men representing various light, power and railway enterprises throughout Colorado, and the sessions covering the three days were marked by the enthusiastic attention to the business in hand by a careful discussion of the excellent papers presented, and by a thorough threshing out of the problems forming the question box.

The first session convened on Thursday morning, and after roll call and the announcement of the minutes, J. F. Dostal, superintendent of construction of the Denver Gas and Electric Company, and president of the association, delivered the annual address. Mr. Dostal called attention to the value of the association work and emphasized the importance of membership. The association had a comfortable balance in the treasury and was a growing influence throughout the entire state. As managers of electrical properties the members must take cognizance of the fact that much depends upon them in satisfying consumers and in keeping upon the books of their companies the customer once secured. The country is now recovering very rapidly from its recent financial depression, and the new conditions are rendering easier the securing of money for investment for permanent improvements. Legislation must be carefully watched and methods of financing given close attention. While a good deal of the recent agitation has shown that some corporations have indulged in questionable financing, it was a fact that in general the Colorado corporations represented in their capitalization dollar for dollar. While sane regulations of corporations would not be frowned upon, the commissions must be composed of practical men. The association's best efforts must be directed toward defeat of harrassing legislation, and nothing would be so important in this direction as keeping the consumers satisfied.

F. W. Frueauff, president of the National Electric Light Association, was introduced. Mr. Frueauff said that while he was active in affairs of the National organization and had been honored by election to its presidency, he wished rather to greet the members as one of their own organization. He believed in the future of the state organization and could see and feel where much valuable work could be accomplished. Mr. Frueauff referred briefly to the important work which the National organization was taking up, and emphasized the importance of the appointment of T. C. Martin as permanent secretary. A great deal of good work had been done in securing new members, and various committees had been appointed or would be appointed to deal with the problems which affect every central station in the country. He took up the matter of affiliation of state organizations with the National Electric Light Association and explained the benefits which would accrue to the local association, and asked that this matter be given some consideration.

George B. Tripp, manager of the Colorado Springs Electric Company, suggested that a committee be appointed to prepare a report on the matter of affiliation.

Mr. Dostal reported that at a meeting of the presidents of the state railway associations just held, the matter of affiliation with the American Street and Interurban Railway Association had been discussed and a committee appointed with instructions to wait upon the executive committee of national association to secure data in this direction. The remainder of the morning session was devoted to the comprehensive consideration of various questions in the question box.

The Thursday afternoon session was convened at about 2:30 o'clock, and the association listened to an address by J. R. Cravath, of Chicago, on several features of illuminating engineering.

Two years ago Mr. Cravath had addressed the association on the subject of the lighting of small stores. The rapid introduction of tungsten lamps with auxiliary appliances had changed conditions somewhat. For the first time in the history of lighting the subject of illumination had been placed upon a sound engineering basis, and with the introduction of the high-efficiency lamps gasoline competition had been almost eliminated. The greatest improvement that had been brought about in the last three years was the increase in the knowledge of the exact effect which could be produced by the various sources of illumination and the improvement in the design and application of proper reflectors. The attention which was now being given to the proper directing of the light rays was making the matter of illumination an exact science. Mr. Cravath described various types of installments and showed how the selection and placing of the light unit and its equipping with proper glassware could be carried out accurately and any predetermined arrangement arrived at. He showed particularly the conditions which were to be avoided and indicated the pitfalls into which lighting men had strayed through not taking into consideration both the source of light and the reflecting surfaces in the room which was the subject of illumination.

S. E. Doane, chief engineer of the National Electric Lamp Association, Cleveland, O., contributed several very valuable features to this discussion. Illuminating engineering had been placed on a scientific basis, and where the lighting companies and consumers could get the advantage of the right kind of experience the results were far beyond the expectations of the most sanguine enthusiasts. In one city where the engineers of the National Electric Lamp Association had sent several of its engineers to install one of two tungsten equipments, the results had been so satisfactory that within three weeks there were 1,700 tungsten lamps on the circuits.

In almost every case the installment of the high-efficiency lamp did not reduce the amount paid to the company. As soon as the better quality of illumination was recognized, others followed suit. In this connection, however, there are more serious problems than the mere efficiency of illumination to be considered. With the increasing efficiency of the incandescent lamp, the present system of charging by central stations was proving inadequate, and unless there was an opportunity for a greatly increased consumption of current the time might come when there would be a reduction in revenue for the central station company. Based upon a readiness-to-serve charge the company was in a position to face any increase in the degree of efficiency without concern.

Mr. Doane also described the successful introduction of eighty-watt series tungsten lamps for street lighting to replace direct-current series arcs. These lamps had a guaranteed life of 1,300 hours and were proving very successful.

The balance of the afternoon session was devoted to the question box.

The Friday session was devoted to a consideration of the question box and several contributed papers. F. P. Cummings, Denver, Colo., contributed a paper entitled "Notes on Meters and Meters Operating on Current Transformers." Mr. Cummings explained the various tests which should be made on meters in order to determine their accuracy and to determine the best meter which might be used on different kinds of circuits.

A paper entitled "Selling Electricity" was presented by H. M. McConnell, of Colorado Springs.

W. J. Canada, of Denver, presented a paper entitled "Notes on Grounded Secondaries." This paper elicited a great deal of discussion, and a number of the members stated that, although they had had experience in grounding neutrals, they considered it advisable because of complications which inevitably arise.

Another matter which was given serious consideration was the question of the best method to use in forcing operators of moving picture shows to discontinue the employment of defective home-made rheostats. Many cases were pointed out where dangerous fires had been started through the use of these devices. It was the consensus of opinion that the association should take definite steps to compel the proprietors of the picture shows to adopt safe appliances.

In opening the Saturday morning session Mr. Tripp, as chairman of the committee on the matter of affiliation, reported that as changes in the constitution and by-laws were necessary in order to act upon the matter of affiliation, the committee recommended that the subject be referred to the incoming administration.

The reports of the secretary, treasurer and auditing committee were received and adopted. The following officers were elected:

President, W. T. Wallace, Colorado Light and Power Company.

Vice-President, H. L. Corbett, United Hydro-Electric Company.

Secretary and Treasurer, J. C. Lawlor, Colorado Springs Electric Company.

Executive Committee, Geo. B. Tripp, Colorado Springs Electric Company; J. F. Dostal, Denver Gas and Electric Company.

Advisory Committee, W. J. Barker, Denver Gas and Electric Company; J. F. Vail, Pueblo and Suburban Traction Company; L. M. Cargo, Westinghouse Electric and Manufacturing Company; John A. Clay, Animas Power and Water Company; John A. Beeler, Denver City Tramway Company.

Finance Committee, W. G. Matthews, Denver City Tramway Company; J. C. Davidson, Hendrie & Bolthoff Company; F. C. Carstarphen, Carstarphen Electric Company.

Membership Committee, J. J. Cooper, Mountain Electric Company; George Woolley, General Electric Company; J. K. Durbin, United States Traction and Lighting Company.

DISTINGUISHED JAPANESE VISITORS AND OFFICIALS OF THE GENERAL ELECTRIC COMPANY AT THE SCHENECTADY WORKS.

The Honorary Commercial Commissioners of Japan at Schenectady.

In the tour of the United States now being made by a group of officially appointed commissioners from Japan a notable point of the itinerary, to the electrical world at least, was the visit made to the principal works of the General Electric Company.

On Monday, October 11, the party of fifty-eight Japanese, including six women and thirteen secretaries, and American representatives of the government and various cities, arrived in Schenectady, N. Y., in their special train. The train carrying the party was shifted into the General Electric Company's yards about 9 o'clock and the party escorted to one of the reception headquarters.

A comprehensive tour of the factories was then made, in which the party was divided into groups, each accompanied by interpreters and guides. An informal luncheon was served to the visitors and company representatives, totaling 125, in the new factory restaurant, which is a new concrete building with modern facilities for serving large numbers of employes daily. At this luncheon the visitors were welcomed by Vice-President E. W. Rice, Jr., who referred to the international significance of the tour as indicating better relations between the two nations, due to the opportunities it afforded for observation of industrial methods and commercial conditions in this country, as well as the personal acquaintances made by the visitors with American business men. He called attention to the fact that as large as the Schenectady plant is it was but one of the General Electric Company's works, representing about sixty per cent of the manufacturing facilities of the company. Brief acknowledgment was made by Baron Shibusawa, chairman of the commission, in which he proposed a toast to America and the General Electric Company, which was heartily responded to by the visitors, and followed by shouts of "Banzai."

Seated at the head table at this luncheon were the following: Baron Eiichi Shibusawa; President C. A. Coffin, of the General Electric Company; Mayor H. S. Van Voast of Schenectady; President Richmond, of Union College; Vice-President E. W. Rice, Jr., of the General Electric Company; Consul-General K. Midzuna, and others.

In the evening, at the Mohawk Golf Club, the entire party of commissioners was entertained by the General Electric Company at a dinner.

INDUSTRIAL SECTION

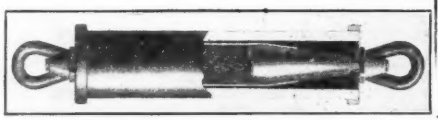
ILLUSTRATED DESCRIPTIONS OF NEW AND STANDARD ELECTRICAL AND MECHANICAL APPARATUS

Westinghouse Strain Insulators.

The necessity of having a power line well insulated, with the conductors securely in place and taut, is well recognized; but the difficulties encountered in erecting such a line are also realized by the constructing engineer. The fragile nature of most insulating material, and the high stresses involved in line construction, render the design of effective insulators very difficult. On the other hand, the economy of high line voltage is a stimulus to the engineer to devise insulators that will withstand heavy electrical and mechanical stresses, because it has been found that the line potentials are only limited by the strength of the insulators available.

The Westinghouse company is marketing a line of insulators which are claimed to solve the insulator problem. These strain insulators include types for any duty that may be required in modern line construction, and are the result of careful research in conjunction with an efficient manufacturing system.

The type adapted to the greatest variety of requirements is known as the wood strain insulator. These insulators are made in various strengths, so that an effective and economical style of insulator is available for any service. They are designed for a working pull up to 4,000 pounds, and single insulators are adapted to voltages ranging from 150 to 11,000 volts. For higher potentials they may be connected end to end in series. The construction of these insulators possesses many inherent advantages, among which are low first cost and long life. The metal parts are furnished in a galvanized finish, which will withstand any atmospheric conditions, and the wood parts are especially treated and sealed to render them thoroughly moisture-proof.

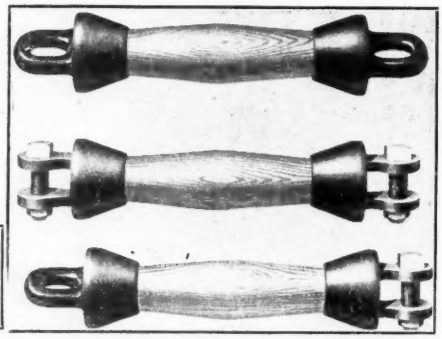


CONSTRUCTION OF WESTINGHOUSE TYPE C INSULATOR.

The end caps are secured to the body by being pressed around the taper shatts on the ends of the wood. This method of securing the caps insures a reliable joint whose strength equals that of the wood body or the metal eye. As the wood body is not fragile, like most insulating materials, it is not subject to breakage from impact.

The end caps are provided with eyes, clevises or tapped lugs, which adapt the insulator for dead-end, anchor guy or steady strain service.

For high-tension lines, the Westinghouse type C insulator is a new and interesting development. The insulator is tested at 40,000 volts before shipment, and its ultimate mechanical strength is upward of 30,000 pounds in tension. For service voltages up to 12,000, and for mechanical strains up to one-third, or in special cases one-half, of the ultimate strength, the type C insulator may be used with entire success. The construction is shown herewith.



WESTINGHOUSE WOOD STRAIN INSULATORS.

A pull on the eyebolts acts directly on the insulating cone to produce compression. This cone is constructed of sheet mica, under heavy pressure, and will withstand a heavy stress. The outside tube is of porcelain, and, being twenty inches long, offers ample creepage distance in any weather. It has no fragile petticoats and is quite inconspicuous. The porcelain acts only as a weather seal and is relieved of any mechanical strain.

The line of high-potential insulators includes disk and skirt types, which excel all others in their respective classes.

The line of low-voltage strain insulators includes Globe, Giant and Brooklyn types, which have been found very efficient in their several classes of service. The adjustable ties include two insulated turnbuckles. One has a porcelain insulator and the other has its eye molded in a special Westinghouse company. This is the same compound used on the Globe, Giant and Brooklyn types, and combines great insulating resistance, with stable structure, in the most extreme climates.

Speer Carbon Brushes.

Since the committee of the Engineering Association of the American Street and Interurban Railway has taken up the carbon-brush question and expressed a desire for a higher grade brush than what they have been using, the Speer Carbon Company, of St. Marys, Pa., has brought out a brush to conform with their specifications. This brush is made by a new process—perfectly homogeneous, uniform, no laminations, and made in four degrees of hardness.

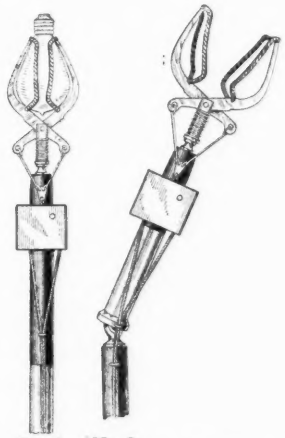
For the past year they have been running some very elaborate service tests on some of the largest city railways and also on the large interurban railways, and they have more than exceeded their expectations. These tests were run on all classes of motors, regardless of the condition of the commutator or brush holder, and a great many of these motors had brush-holders that were badly worn, as they desired to give them the hardest test possible. All these tests showed a mileage of from 30,000 to 50,000 miles. They have now completed a sufficient number of their large tests to satisfy themselves that this new brush meets with all the requirements of the Engineers' Association.

Going into comparisons between the statistics of the twenty-five commercial land line and ocean cable telegraph systems and of the telephone systems, it may be noted that the first telegraph line in the United States was opened for business in 1844, and thirty-two years later the telephone was introduced. At the 1880 census the telephone companies reported 34,305 miles of wire, about one-ninth of the mileage of the telegraph companies. In 1902 the telephone mileage of wire was almost four times as great as that used for telegraph purposes. In 1907 the telephone mileage was eight times as great as the telegraph.

Edgerton's Lamp Cleaner and Adjuster.

A new form of electric lamp cleaner and adjuster, made by E. E. Edgerton, 6319 Lexington Avenue, Chicago, is shown in the accompanying illustrations. It is operated by adjusting it upon a one-and-one-eighth-inch pole of light wood, suitable for the height wanted. It is made in two styles, as may be seen in the illustrations. No. 1 is straight and No. 2 has a joint for inverted lamps. Lamps from one-half to four inches in diameter and six inches long may be held in this device by means of clamps.

The clamps are covered with rubber, and a light pull on the cord will grip the



No. 1. No. 2.
EGDERTON LAMP CLEANER AND ADJUSTER.

lamp firmly, and it is held so by the ratchet until released by the other cord. Thus an old lamp can be taken out and released and a new one clamped and inserted without handling the lamp. A telescope joint, screw-eyes, and cords are furnished with each outfit.

The simplicity and durability of its construction and its adaptability to all lamps of ordinary size make this cleaner a very desirable article.

Turbine-Blade Guessing Contest at the Denver Railway Exhibition.

One of the interesting features of the exhibition of street-railway apparatus held by the American Street and Interurban Railway Manufacturers' Association at Denver, Colo., October 4 to 8, was the guessing contest conducted by the Allis-Chalmers Company, of Milwaukee, Wis. The blades from a 1,000-kilowatt steam turbine were placed in a glass case, and everyone was invited to participate, there being no limit to the guesses allowed each person. Both delegates to the railway convention and their ladies, and manufacturers and manufacturers' representatives and their ladies participated.

The prizes were beautiful, serviceable and costly, and included a brushed brass writing set, a game set with mahogany case, a pair of sterling silver-mounted military brushes, a gold-mounted Gillette safety razor set, a set of embroidery scissors, silver crumb-tray, cut-glass powder jar, jewel case, and twenty-four silver Milwaukee souvenir spoons.

At 4 o'clock on Thursday afternoon the contest was declared closed. The number of blades in the case was found to be 6,199. The winners of first prizes for both delegates and manufacturers guessed the exact number, and the winners of the second prize for both delegates and manufacturers guessed 6,200, one away from the exact number. Among the men the guesses bunched closely around the exact number, the time-stamp in several instances determining the award. The indefatigable manager of the contest, F. G. Bolles, placed the prizes in the hands of practically every one of the lucky ones before the exodus from the convention city began.

J. T. Ross, of the Northern Ohio Traction and Light Company, Akron, Ohio, guessed the correct number, and won the first delegate's prize. The second delegate's prize went to Edwin C. Faber, of the Aurora, Elgin & Chicago Railroad. Milwaukee souvenir spoons were awarded to F. M. Ellis, Rockford & Interurban Railway, Rockford, Ill.; Sydney M. Bamburger, Salt Lake & Ogden Railroad; J. H. Pardee, J. G. White & Company, New York; A. E. Hook, Colorado Springs & Interurban Railway; Thomas A. H. Hay, Northampton Traction Company, Easton, Pa.

In the ladies' delegate class the first prize went to Mrs. W. M. Quackenbush, Mt. Clemons, Mich. Mrs. Ernest Gonzenbach, Sheboygan, Wis., won the second prize. Souvenir spoons were awarded to Mrs. W. H. Collins, Schenectady; Mrs. H. G. Vordenmark, Fort Wayne, Ind.; Mrs. Thomas Hawkin, Rockland, Me.; Mrs. Russell Howard, Green Bay, Wis.; Mrs. George Radcliffe, Schenectady.

In the manufacturers' class, the prizes were awarded as follows: First, George H. Berg, Illinois Stoker Company; second, A. A. Gray, ELECTRICAL REVIEW, Chicago, Ill. Souvenir spoons went to J. C. McQuiston, Westinghouse Companies, Pittsburg, Pa.; Percy Houts, Brecht Company; H. L. Monroe, General Electric Company, Chicago, Ill.; W. M. Lawyer, Whitmore Manufacturing Company, Cleveland, Ohio; H. J. Summers, Planet Company.

The ladies of the Manufacturers' Association secured prizes as follows: First, Mrs. J. M. Griffin, Wheel Truing Brake Shoe Company; second, Mrs. E. D. Batchelor, Pittsburg, Pa. Souvenir spoons were awarded to Mrs. W. H. Stieglett, John A. Roebling's Sons Company; Mrs. Rollin Gerry, Jones & Laughlin Company; Mrs. E. H. Hammond, American Electrical Works; Miss M. Sampson, Denver, and Miss Helen T. Fuller, Denver.

In connection with the guessing contest a peculiar coincidence was discovered in the fact that Mr. Faber and Mr. Gray, who each won second prizes, both guessing the same number, were close together in the guess on the arriving time of the special train from Chicago over the Chicago, Burlington & Quincy, the pool going to Mr. Faber from Mr. Gray by a margin of two minutes.

The Railway Exhibits at Denver.

One of the most important and valuable features of the convention of the American Street and Interurban Railway Association and its affiliated associations at Denver, Colo., October 4 to 8, was the great exhibition of electric-railway apparatus under the auspices of the Manufacturers' Association. The big Auditorium floor space and galleries were filled, and the overflow was well housed in a tented structure extending as an ell flanking the Auditorium on two sides The car exhibit was made on the tracks in the street adjoining one section of the tent. The display was well arranged, with plenty of room for freedom of movement, the exhibition buildings were well lighted and well ventilated, and the weather conditions almost perfect. Too much commendation cannot be given to the Manufacturers' Exhibition Committee for their magnificent arrangements and handling of this great display.

The Manufacturers' Exhibition Committee was composed of L. M. Cargo, chairman, the Westinghouse Companies, Denver, Colo.; C. M. Atwood, the Sherwin-Williams Company, Denver, Colo.; R. M. Babbitt, *Electric Railway Journal*, Chicago, Ill.; G. W. Cox, Electric Service Supplies Company, Keokuk, Iowa; Arthur T. Herr, American Brake Shoe and Foundry Company, Denver, Colo.; H. J. Kenfield, *Electric Traction Weekly*, Chicago, Ill.; Chas. Knight, American Steel and Wire Company, Chicago, Ill.;

H. G. McConnaughy, Dearborn Drug and Chemical Company, New York city; S. P. McGough, the Lorain Steel Company, Chicago, Ill.; C. J. Olmstead, Westinghouse Traction Brake Company, Chicago, Ill.; R. H. Thompson, J. G. Brill Company, Denver, Colo.; A. L. Wilkinson, the Ohio Brass Company, Mansfield, Ohio; F. W. Darlington, director of exhibits.

The exhibits and general arrangements were under the direction of Vice-President Kenneth D. Hequembourg, general sales agent, Walker-Bennett Manufacturing Company, New York city.

Among the companies exhibiting were the following, with their representatives:

Allis-Chalmers Company, Milwaukee, Wis.—Air brakes, railway motor and controllers. Represented by F. G. Bolles, J. H. Waterman, J. R. Jeffrey, James Gardner, I. L. Dimm, R. B. McConney, E. W. Stull, F. W. Fanger, George Baiz. In addition to an elaborate exhibit of railway and kindred appliances, the company exhibited parts of steam turbines and distributed a series of handsome bulletins describing its various products. The company also conducted a unique guessing contest, which is described on another page of this issue. The company also exhibited Bryan-Marsh tantalum railway lamps.

Aluminum Company of America, Pittsburg, Pa.—Aluminum cable for high-tension transmission lines, aluminum feeder cables, lead-covered aluminum cables, rubber and paper insulation, various styles of joints, aluminum busbars. Represented by F. N. Baylies, E. H. Noyes, S. K. Colby.

American Steel and Wire Company, Chicago, Ill.—Electrical wires and cables, rail bonds and bonding tools, right-of-way fence. Represented by Charles R. Sturdevant, B. H. Ryder, F. A. Keyes, J. M. Holloway, J. D. Sutherland, E. R. Pool, W. H. Williams, W. R. Abbott, E. E. Aldous.

Anderson, Albert & J M., Manufacturing Company, Boston, Mass. — Sixty-six-thousand-volt, truss type, disconnecting switches, switches and pure copper castings, remote control mechanism for oil switches and time switches for alternating circuits up to 3,000 volts. Represented by Alfred E. Anderson, Henry Woltmann, Ernst Woltmann.

Avery Scale Company, North Milwaukee, Wis.—Automatic track scale and automatic elevator scales. Represented by B. P. Ordway, N. C. Webster.

Babcock & Wilcox Company, New York, N. Y.—B. & W. model of horizontal boiler and two types of boiler heads. Represented by F. A. Einfeldt, Charles Onderdonk, William Turner, Harry Byer.

Buckeye Electric Company, Cleveland, Ohio—Buckeye tantalum railway lamps. Represented by L. P. Sawyer, J. H. Cooke, A. G. Lucas, J. M. Johnson.

Consolidated Car Heating Company, Albany, N. Y.—Electric car heaters, motorman's cab heaters, house heaters, quick break knife switches, high-voltage push button, signal system, light signal to motorman indicating when doors are closed on multiple-unit train service, pneumatic door operator. Represented by Cornell S. Hawley, W. S. Hammond, Jr., Thomas Farmer, Jr.

Crouse-Hinds Company, Syracuse, N. Y.—Arc and incandescent headlights, condulets, panel-boards and cabinets, knife switches, harpoon guy anchors. Represented by F. F. Skeel, A. F. Hills, F. W. Buchanan, D. C. Gidley.

D & W Fuse Company, Providence, R. I.—Fuses and cut-outs including railway cut-outs, service switch boxes and fuse boxes for 250 and 600 volts and transformer and high-tension junction fuse boxes for both pole and subway installations, square and rectangular wires with Deltabeston insulation, field and armature coils. Represented by L. W. Downes, Willard S. Sisson, F. D. Ligon, H. M. Nichols.

Dearborn Drug and Chemical Works, Chicago, Ill.—Scientific methods in the treatment of boiler feed waters to prevent scale, corrosion, pitting and foaming. Represented by George R. Carr, H. G. McConnaughy, D. E. Cain.

Duntley Manufacturing Company, Chicago, Ill.—Pneumatic cleaners, motor-driven section cars. Represented by L. C. Thompson, George Clements.

Electric Service Supplies Company, Philadelphia, Pa.—Pay-within car, automotoneer, Garton-Daniels lightning arresters, Keystone pneumatic bell ringer, sander and valves, protected rail bonds, Keystone overhead material, improved St. Louis trolley pick-up, Lyon reinforced steel gear cases, sheet steel tool boxes. Represented by Chas. J. Mayer, J. W. Porter, Max A. Berg, J. V. E. Titus, E. R. Mason, Thos. H. Henkle, C. E. Ewing, G. W. Cox, M. S. Earl.

General Electric Company, Schenectady, N. Y.—Type M control equipment; complete emergency straight-air brake equipment for motor car and trail car; New York variable release motor car air brake equipment; railway motors; aluminum cell lightning arresters; magnetite arc headlights; indicating and recording steam meters; air compressors; alternating-current railway signal system; complete line of rail bonds and line material. Represented by F. H. Gale, J. G. Barry, H. N. Ransom, W. G. Carey, C. E. Barry, E. D. Priest, F. E. Case, A. H. Armstrong, S. W. Trawick, W. J. Clark, C. B. Keyes, T. Beran, H. G. Geier, R. E. Moore, H. L. Monroe, J. W. Buell, G. D. Rosenthal, C. C. Peirce, H. M. Winter, A. W. Arlin, A. V. Thompson, C. W. Blivin, H. C. Marsh, W. J. Hanley, Irving Hale, G. A. Woolley, H. C. Glaze.

Gest, G. M., New York, N. Y.—Cable racks. Represented by H. H. Stannard. Mr. Stannard also represented the New York Pole Company, exhibiting its patented method of reinforcing tubular poles with nests of steel rods and cement grout introduced into the hollow pole under pressure.

H. W. Johns-Manville Company, New York, N. Y.—Porcelain insulators, transite asbestos wood, low-voltage overhead line material, catenary line material, molded insulations, indurated fiber forms for third-rail protection, high-voltage oil-switch tanks and fiber conduit, Noark enclosed fuse and service boxes, fuses and devices for high and low-voltage service, J-M guy anchors and mine supplies, friction tape and rubber compounds, asbestos and magnesia pipe and boiler coverings, packings, linolite, desk and table lamps. Represented by J. W. Perry, George A. Saylor, A. H. Pierick.

Kerite Insulated Wire and Cable Company, New York, N. Y.—Insulated wires and cables for alternating-current and direct-current feeders, transmissions, signals, telephone, telegraph, car wiring, and car house wiring. Represented by R. D. Brixey, Azel Ames, P. W. Miller, J. A. Renton, J. V. Watson, B. L. Winchell, Jr., R. E. Butterick.

Massachusetts Chemical Company, Walpole, Mass.—Liquid and rubber insulating specialties, Armalac, Enamelac, friction tapes, splicing compounds, filling compounds, cement; molded rubber specialties. Represented by L. O. Duclos, A. E. Duclos, E. W. Furbush.

National Carbon Company, Cleveland, Ohio.—New Laclede railway motor brushes, also Columbia, National high-grade Partridge, high-grade Partridge, Perfection and other railway motor brushes, special graphite brushes, standard pig tail brushes. Columbia dry cells, railway signal dry cells, headlight carbons, turbine rings. Represented by W. B. Brady, O. T. Weaver, F. D. Kathe, F. J. Kysela.

Ohio Brass Company, Mansfield, Ohio.—Trolley hangers, ears and clamps, catenary fixtures, mine trolley fixtures, rail bonds, automatic car couplers, pneumatic sanders, electric car signals, third-rail insulators, high-tension porcelain insulators. Represented by C. K. King, A. L. Wilkinson, L. W. Olson, E. F. Wickwire, G. A. Mead, N. M. Garland, J. E. Slimp, F. V. Cook, E. C. Brown, F. E. Johnson, R. J. Deneen, F. S. Deneen, G. W. Cooper, C. H. Tomlinson, A. L. Price.

Rail Joint Company, New York, N. Y.—Continuous, Weber and Wolhaupter rail joints for T, high T and girder rails, both standard and compromise. Represented by F. C. Webb, J. A. Greer, W. T. McCaskey, W. E. Clark, E. L. Vandresar, P. D. Watson.

Roebling's Sons Company, John A., Trenton, N. J.—Reception room and literature describing all grades and kinds of wires and cables. Represented by A. B. Conover, W. H. Slingluff, J. McG. King.

Standard Paint Company, New York, N. Y.—P. & B., S. P. C. varnish, compounds and insulating tape; Novac compound for impregnating coils. Represented by Charles E. Smith, Bernard C. Beckman, John H. Thomas, J. I. Pfeiffer.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y.—This company made an elaborate and very interesting working exhibit of telephone apparatus and railway signaling apparatus. Represented by A. M. Hanbrich, H. W. Lucia, C. P. Button, H. C. Slemin.

Speer Carbon Company, St. Marys, Pa.—Motor and generator brushes. This company's line of high-grade railway motor brushes, conforming to the specifications of the Standards Committee of the Association, commanded a great deal of interest. Represented by J. S. Speer.

Wagner Electric Manufacturing Company, St. Louis, Mo.—Wagner single-phase motor, skeleton governor mechanism of single-phase motor; the Wagner "moral-ameter," with which a good deal of fun and diversion was had. The "moral-ameter" was always surrounded by a lot of railway men anxious to have their mental condition prognosticated. Represented by Walter Robbins, Frank N. Jewett, Ray D. Lillibridge, O. H. Davidson.

Western Electric Company, New York, N. Y.—Railway telephones, portable telephone sets, bells, buzzers and batteries, Electrose insulation, strain insulators, Ideal cap and cone hangers, line and overhead construction material, armature and field coils, Kalamazoo trolley wheels, harps and sand boxes. Represented by F. C. Killion, R. H. Harper, W. E. Harkness, M. H. Nichols, C. L. Howk, A. Brown, H. C. Biglin, H. Olsen.

Westinghouse Companies, Pittsburg, Pa.—Sixty-ton interurban car of the Denver & Interurban Railway, equipped with unit switch control and four 125-horsepower motors, and designed to operate on 11,000-volt alternating current and 600-volt direct current; fifteen-ton mining locomotive, twenty-five-kilowatt turbo-exciter set, No. 5 Westinghouse-Leblanc condenser with motor-driven air and water pump; line and trolley material, catenary construction, poles; car circuit-breakers, arc headlights, multiple-unit switch control apparatus, train connectors, gears, traction brakes, lightning arresters, interpole railway motors, types CCI, DA, HF and SA motors; series, 110-volt and "W" and "V"

sign tungsten lamps. Represented by Joseph R. Ellicott, Charles Ellicott, S. D. Hutchins, S. J. Kidder, A. L. Humphrey, E. L. Adreon, E. H. Sniffen, J. C. Kyle, J. A. Brett, C. W. Register, J. L. Tritle, Horace Clark, C. Olmstead, C. C. Chappelle, I. L. Brinsmade, G. O. Noble, E. E. Heise, W. S. Bartholomew, J. C. McQuiston, E. H. Heinrichs, J. C. Kyle, L. M. Cargo, Thomas Cooper, L. H. Kidder, W. L. Conwell, D. W. Belden.

The *Electric Railway Journal* maintained a publication office at Denver and printed daily issues during the convention. Complete lists of exhibits and exhibitors were published, together with full reports of the proceedings, and papers and committee presentations. A feature of these dailies were the "Conventionalities" and side-lights upon the exhibitions and the prominent men in attendance. The representatives were James H. McGraw, J. M. Wakeman, H. W. Blake, Joseph A. Kucera, L. E. Gould, Rodney Hitt, F. Nicholas, Walter Jackson, W. E. Keily, C. A. Babtiste, W. K. Beard, C. T. Walker, R. M. Babbitt, E. J. Hunt, H. E. Hopkins, Malcolm Muir, Miss J. Phelps, Miss M. Murphey.

The American Carbon and Battery Company, Chicago, Ill., was represented by H. J. Wrape, P. H. McGauley and C. V. Mayer.

The Bryan-Marsh Electric Company, Chicago, Ill., was represented by J. S. Corby.

The Standard Underground Cable Company, Pittsburg, Pa., was represented by J. R. Wiley, western manager, Chicago.

The Kenfield-Fairchild Publishing Company, Chicago, Ill., publisher of the *Electric Traction Weekly*, was represented by H. J. Kenfield, George S. Davis, W. J. Field and A. M. Standish.

The National Electric Lamp Association, Cleveland, Ohio, was represented by S. E. Doane, chief engineer, and George S. Merrill, of the engineering department.

The ELECTRICAL REVIEW AND WESTERN ELECTRICIAN was represented by A. A. Gray, managing editor.

The Electric Storage Battery Company, Philadelphia, Pa., was represented by Godfrey H. Atkin, western manager, Chicago, H. P. Marshall and R. L. Lunt, of the Chicago office.

The Valentine-Clark Company, Chicago, was represented by President E. L. Clark.

The Western Pole and Lumber Company, Denver, was represented by President B. F. Vreeland, M. G. Graff and W. H. Lewis.

The Chicago Pneumatic Tool Company, Chicago, was represented by C. B. Coates, B. C. Morse, J. A. Ercland, George Morse.

Dossert & Company, New York, was represented by H. B. Logan, president, F. C. Shaw, W. A. Cowling.

Westinghouse, Church, Kerr & Company, New York, were represented by H. H. Kerr.

The John A. Stewart Electric Company, Chicago, was represented by W. H. Stewart.

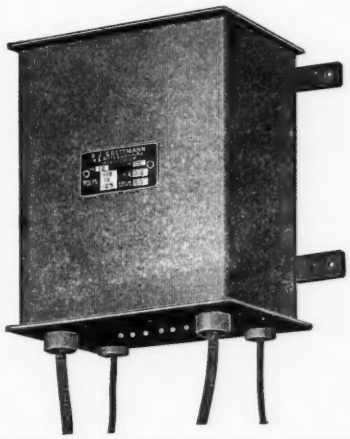
The Lord Electric Company, New York, was represented by Henry Jones, O. N. Davidson, J. C. Williams.

The Crocker-Wheeler Company, Ampere, N. J., was represented by D. Vance Sickman, George Mitchell.

The Joseph Dixon Crucible Company, Jersey City, N. J., was represented by John Ready, L. H. Snyder.

Low-Voltage Transformers.

The wide and varied use of electricity in the advertising world has opened a field for the electrical transformer, by means of which the ordinary commercial current can be utilized for the various forms of street signs to the best advantage. As the electric sign business has

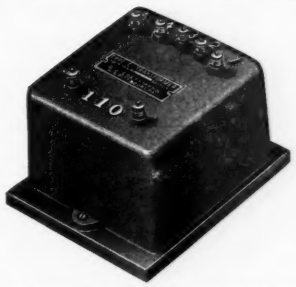


GOETTMANN TUNGSTEN SIGN-LIGHTING TRANSFORMER.

developed, the demand comes for the brightest light obtainable, and good results in this line have been secured by the use of tungsten lamps. To use these lamps the ordinary commercial current must be reduced and regulated by the use of a transformer, and O. J. Goettmann, 525 E. Ohio Street, Pittsburg, Pa., is marketing one which is giving good satisfaction.

This transformer, shown in an accompanying illustration, is mounted in an enameled weatherproof case so constructed as to be easily attached to the wall, and in appearance is very neat. Special care has been exercised in the core, the highest grade of silico-vanadium steel being used. On account of the low voltage secured the transformer is a self-cooling one.

This company is also marketing three special types of transformers particularly adapted for household and office use. By



GOETTMANN TYPE "C" TRANSFORMER.

using these transformers an electric-light current may be made available to operate electric bells, annunciators, indicators, electric toys, etc.

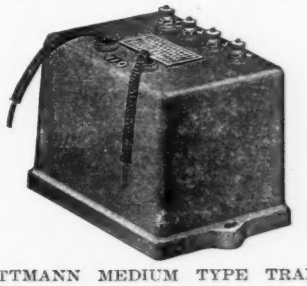
One of these, known as the "Roberts" or type "C" transformer, is the largest of the three, and is suitable for a large annunciator for hotels, for operating a small train of cars, or, in fact, will meet all

GOETTMANN BELL TYPE TRANSFORMER.

ordinary requirements of a large establishment.

The medium size transformer will operate a dozen bells or push buttons at one time, and fill the requirements of a residence, store or hotel.

For residences where only the ordinary door bell, and, probably one or two an-



GOETTMANN MEDIUM TYPE TRANSFORMER.

nunciators are in service, the smallest or bell type has been found suitable.

All sizes of transformers can be placed inside the building, and are built and finished with that end in view. They will operate successfully on circuits ranging from 100 to 125 volts. Views of these three sizes of transformers are shown herewith.

Electric Commercial Vehicles.

In a recent issue of one of the New York dailies there appeared a striking commentary on the actual effect which confidence in motor-driven vehicles was having in replacing the horse for commercial trucking. It is not unusual nowadays to find large companies owning teaming privileges abandoning entirely the horse-drawn vehicles and substituting motor-driven wagons. In line with the rapid introduction which the electrical vehicle is having in every large city in the country a number of orders recently booked by the General Vehicle Company is of interest.

The R. W. Macy Company, of New York city, has had a very fortunate experience with electric wagons and has added to its equipment by placing a repeat order for twelve 2,000-pound capacity delivery wagons.

The New York *Sun* has had an unusual experience. In 1907 the company put in an equipment of electric wagons, and during this interval has tried out several types of gasoline machines, importing a number from abroad. It is encouraging, indeed, to note that, after a thorough trial of each type, an order has just been placed for three more electric wagons similar to those installed in 1907.

The service required of these delivery wagons for newspaper work is very severe. They must operate in all kinds of weather, must be absolutely dependable, as the papers are loaded at the last minute and a very quick run must be made to all of the outgoing railroad stations. The drivers are a hardy, reckless lot, and both motor and wagon must withstand almost every conceivable vicissitude of service.

The Commonwealth Edison Company of Chicago, has been using a five-ton electric General Vehicle truck for the past six years and has just placed an order, through the western office, for a number of electric wagons of a lighter capacity.

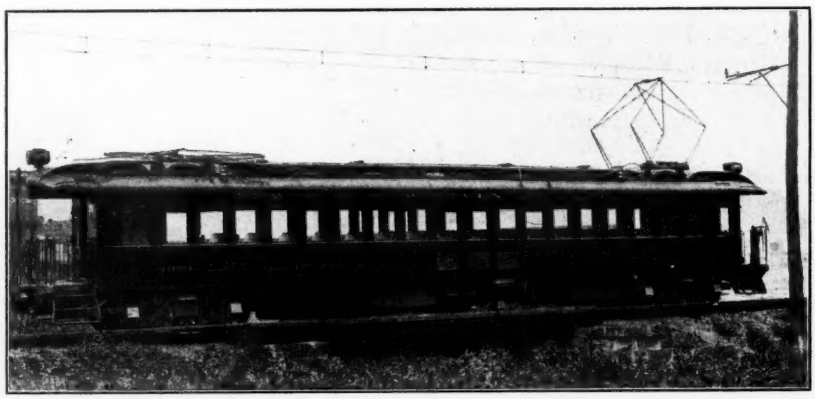
The Cleveland Electric Illuminating Company has placed an order, through the Chicago office, for a three-and-one-half-ton truck, with an electric windlass for pulling cable and loading and unloading.

The principal office and factory of the General Vehicle Company is at Long Island City, New York, and the Chicago office is at 417 Rookery, in charge of P. C. Chrysler, western manager.

Motor Cars for the New Haven Suburban Service.

At the East Pittsburg shops of the Westinghouse Electric and Manufacturing Company, there is now being installed the electrical equipment of a number of motor cars for the suburban service of the New York, New Haven & Hartford Railroad. These handsome cars are designed to operate on both 11,000-volt alternating-current catenary trolley of the main New Haven electrification, and on the 600-volt direct-current third-rail section entering the New York terminal.

By reason of the fact that the New Haven equipments are also required to operate on the direct-current third-rail, the control equipment for effecting a change from alternating to direct current is necessarily more extensive than had the control been arranged for straight alternating-current operation throughout, but as seen in the accompanying illustration, this auxiliary apparatus has been so well distributed under the floor that there is ample room for everything in the space between the trucks.



ELECTRIC STEEL PASSENGER COACH FOR NEW HAVEN SUBURBAN SERVICE.

These cars, which are intended to pull trailers, are equipped with four series compensated motors. These and the step-down auto-transformers are supplied with forced ventilation from the blower system. When the equipment is operated under forced ventilation the one-hour railway rating of each motor is then 200 horsepower.

Each car is guaranteed to haul two fifty-ton trailers, and when so operating will accelerate normally at a rate of 0.7 mile per hour per second.

The arrangement of the motors differs from that of any other cars in use in this country, in having the motor geared to a quill surrounding the axle, which is geared to the driving wheels by means of driving springs of the same type as are used successfully on the New Haven electric locomotives.

The cars are seventy feet in length, weigh eighty-six tons, and have a seating capacity for seventy-two persons. The car bodies and trucks were built by the Standard Steel Car Company, and are of fireproof steel construction throughout. They are handsomely finished and are said to be the most easy-riding cars ever built.

A New Rubber Tree in Chili.

The United States Consul at Valparaiso writes as follows concerning the *Euphorbia lactiflua,* a rubber shrub discovered by the botanical section of the national museum of Chili:

"A very good quality of rubber can, it is claimed, be easily made from this shrub, which is found on the mountains and table lands of that portion of the interior of Chili extending from Taltal south to Caldera, a distance of about seventy-five miles. It is said to be of no other use than for rubber and wood pulp. It is claimed that extracting the sap does not injure the plant, and that there seems to be a future for the industry if attention be given to its cultivation. It is badly scattered, and in many cases difficult of access, but it is claimed that it could easily be cultivated. A company has been organized to develop the industry, and is seeking a concession."

Independent Telephone Convention at Chicago.

The annual convention of the International Independent Telephone Association will be held at the Auditorium Hotel, Chicago, on December 7, 8 and 9. An attendance of from 800 to 1,000 Independents is expected. Arrangements for a very successful meeting are being perfected by the executive committee.

Current Electrical News

GREAT BRITAIN.

(Special Correspondence.)

LONDON, OCTOBER 4.—An interesting item is the fact that a twenty-two-and-one-half candlepower Osram lamp for burning on 200 to 260-volt circuits has now been placed on the market.

An endeavor is being made in the House of Commons, by those interested in motor omnibuses, to secure Government action in the direction of compelling tramway authorities to fit hooters to their cars which will "audibly" announce when the legal limit of speed has been exceeded. It may be stated that such a provision was recently put upon the motor omnibus companies in London by the Commissioner of Police. In connection with tramways, however, varying limits of speed are imposed for different portions of the district traversed, and this naturally introduces considerable difficulties in attempting to enforce such a regulation. The question, however, is said to be under consideration by the authorities.

A year or two ago it may be remembered that there was considerable controversy concerning the effect of the London County Council electric-power station at Greenwich upon the Royal Observatory, which is close by. A committee of experts was appointed to go into the matter with the result that certain modifications were made in the design of the second portion of the tramway power station, which was then under construction. About the same time the question also arose as to the possible effect upon the instruments in the observatory in the event of the Council deciding to install the overhead system, or any system in which there is not an insulated return. To pacify the authorities at the time it was agreed to give the Astronomer Royal a veto upon all tramways within a radius of three miles of the observatory. In other words, he would have to approve of the mode of construction. An instance has just arisen in which this veto has been given effect to, the tramways in question being in the Woolwich district and within the three-mile limit. Although work had actually been started on the line in question—which it was proposed to equip upon the ordinary overhead system—operations have had to be suspended and there is some talk of a special three-wire system being evolved to meet the exigencies of the case. Officials on both sides, however, are very reticent as to what is going on.

It is announced that the opening of the single-phase railway in the south of London will have to be postponed from October 1 until December 1, the reason for this being differently stated in different quarters. There have been no technical difficulties encountered with the construction of the line, however, and it may be taken as correct that delays on the part of the contractors are the main cause. As far as the work has progressed the Board of Trade, as the authority which has to be satisfied, has not made any complaints.

The first British-made railless electric car is now undergoing experimental trials near London. The car has much the appearance of a small single-deck tramcar or motor omnibus on rubber-shod wheels, plus the double trolley pole. The electrical equipment consists of two twenty-five-horsepower railway motors of the B. T.-H. Company's standard construction, with the usual series-parallel controller and grid resistances. It seats twenty-two passengers and has two additional seats on the rear platform. The drive is by chain as in the case of most petrol-driven omnibuses, the two motors being independent of each other. The equipment of the car differs considerably from its continental prototypes in that the trolley head is of the under-running variety and special precautions have been taken to prevent the metal framework of the car becoming electrically charged, a point which those responsible for the continental cars of this description have, to some extent, overlooked, or at any rate have run great risks. The overhead line with which the experiments are being made consists of a pair of trolley wires, but a design in which three overhead wires are employed has also been prepared.

A proposal to deposit a bill in Parliament for powers to construct a tube-electric railway from Victoria station to the Crystal Palace has not been particularly well received generally. A feeling has been gaining ground for several years past that the best way in which to improve locomotion in London is to reorganize the existing services, and evidence of what can be done in this direction is given by the results obtained upon the district and other lines during the past half year. In any case the capital of the proposed undertaking will have to be underwritten, for it will assuredly never be forthcoming from the general public. The capital is $17,500,000 and a very eminent traction expert is advising the promoters.

For some years now a question which has remained unsettled in relation to traction undertakings is as to who should bear the cost of installing in telephone exchanges the heat coils and fuses necessary to afford protection against the accidental contact of telephone wires with traction trolley wires. The tramway authorities have held that this expense should fall upon the postmaster-general and the latter, of course, has held a contrary view. Arbitration was eventually resorted to to settle the dispute and the proceedings duly came off this summer. It was agreed that all tramway authorities in the Kingdom should abide by the arbitrator's award, although the actual arbitration proceedings only related to one particular tramway. The arbitrator decreed that the expense in question should be borne by the tramway companies. As there is no question of an appeal the point is settled for all time.

A very gloomy statement was made by the chairman of Messrs. Dick, Kerr & Company at the annual meeting this week. He stated that during the past year less work had been carried out in all their departments than in any previous year and that he could hold out no immediate hope of any improvement. Severe competition still continued and had even penetrated into foreign markets. It may be mentioned that the company paid six per cent dividends on both preference and ordinary shares.

The Poplar Borough Council (London) has decided to duplicate its plant for the manufacture of disinfectant by electrolytic methods, so successful has this proved during its two years' existence.

An instance of commercial methods in electric-power supply in Great Britain is to be found at Hanley (Staffs). In order to secure a large power user the corporation agreed to purchase the firm's stock of coal which had been laid in for the existing steam plant. The purchase was agreed to be carried out at the rate per ton paid by the corporation for its ordinary coal supply for the electricity works. G.

CONTINENTAL EUROPE.

(Special Correspondence.)

PARIS, OCTOBER 5.—At Marseilles there is an electric-traction project on foot for a local railway line, which is to run from the suburban town of Saint Antoine to Martigues. In the Pyrenees region of France a local company has applied for a concession for an electric tramway, which is to run from the port of Bayonne to the much-frequented watering place of Biarritz. At Roubaix, in the north of France, it is likely that there will be an extension made of the present electric-tramway system in the town, and the municipality is to award the contract for the work to a local company.

As regards electric-lighting projects, I note that the town of Pleaux is to install an electric plant. The locality of Milau will also have a light and power plant erected in the near future. Le Chatelet-en-Brie is another town in which an electric-lighting project is being considered and, among others, I may mention the localities of Dazulé in the Channel region, the town of Firmy and the town of Bourges, all of which are to have electric plants erected.

Among the new companies formed at Paris is the General Construction and Renting Company for erecting electric plants. At Collonges there is formed the Schussel, Guy and Dumartheray firm, for electric-lighting plants. The Société Française de l'Electricité Economique, at Mureaux, is to be engaged in light and power plants. At Mendon, the firm of Charet Bros. is occupied with electrical construction work. Taupin, Auge et Cie, of Paris, are constructors of electric apparatus. Dynamos and apparatus are built by the new firm Bosshard, Poirier et Cie, at Charleville.

In Austro-Hungary there is being considered a project of some scope for a hydraulic plant, which is to furnish a supply for several towns of large size such as Arad, Hadju and Bihar. The station is to be erected on the Dragan stream by one of the large electric companies, and as the stream runs in a narrow valley there is to be used a large reservoir formed by backing up the water for some distance. The head of water to be secured in the present plans is 290 metres, at the rate of 7,000 litres per second. There is a project on foot for an electric railroad from Budapest to the town of Peczel, and the municipalities are now coming to an agreement on the question.

A syndicate of electric firms has made a proposition to purchase the whole of the electric tramway system of St. Petersburg. The Allgemeine firm, the English Westinghouse Company and the Siemens & Halske firm compose the syndicate in question and all the lines, stations and rolling stock are to be

purchased for the sum of thirty million roubles. In this agreement the municipality will receive a certain portion of the net receipts of the lines, about seven-and-one-half per cent, and will become the ultimate owner of the whole system in fifty years.
A. DE C.

WESTERN CANADA.

(Special Correspondence.)

WINNIPEG, OCTOBER 11.—The city of Fort William, Ont., has granted the Slate River Telephone Company connection with the municipal telephone system. Connection will also be made with several other nearby systems in the near future.

At Lethbridge, Alta., a local company is being formed to build a street-railway system with radial lines to adjacent settlements and villages.

The Hydro-Electric Commission, Toronto, Ont., is making arrangements to erect a substation at Port Arthur, Ont., to supply that city with power from Niagara Falls. The rate will be $17 per horsepower, which will be gradually reduced to $13.

The Creston Telephone, Light and Power Company, of Creston, B. C., is now completing its telephone system in that town and proposes shortly to commence the construction of telephone lines to adjacent towns.

The British Columbia Electric Company has decided to rush to completion its proposed power development and plant on the Jordan River, near Victoria, B. C. Wynn Meredith is supervising engineer for the work, which will cost approximately $1,500,000. R. H. Sperling, Vancouver, B. C., is general manager.

The hydroelectric plant at Fort Francis, Ont., is nearing completion and it is expected to be in operation by December. The price to consumers will be $12 per horsepower.

Rural telephones are in great demand in Manitoba at the present time and the Government Telephone Commission is unable to keep up with the demands. During the past two weeks a large number of applications have been received, but the majority of them will be left over until next year. Local exchanges at Gimli, Tuelon, Strathclair and Medora have been opened within the past few days.

By an almost unanimous vote the ratepayers of Lacombe, Alta., voted in favor of the town taking over all the assets of the Blindman River Power Company, which supplied the town with light until recent financial difficulties appeared.

The Kootenay Telephone Company, of Cranbrook, B. C., is rushing construction on its lines to the east in order to make connections with the system of the Alberta government. To the south the company is also building lines to connect with the Bell Company in the state of Washington.

The Grand Trunk Pacific Railroad Company is installing a complete telephone system in Prince Rupert, B. C., its western terminal. Address A. B. Smith, manager of telegraphs, Winnipeg, Man.

The Burrard Power Company, Vancouver, B. C., has been granted 25,000 miner's inches of water from the Lillooet River and will at once proceed with the erection of a large power plant to supply light and power in Vancouver. The proposed development is twenty-three miles from Vancouver.
R.

IMPORTANT DEVELOPMENT.

(Special Correspondence.)

POWER AND LIGHT COMBINATION—The Electric Bond and Share Company, of New York, with which interests of the General Electric Company are identified, has effected a consolidation of a number of important light, heat, power, electric and gas companies of the West. The consolidated company is known as the American Power and Light Company, and will have a capital stock of $15,000,000, of which $5,000,000 will be accumulative six per cent preferred from October 1, 1909, and $10,000,000 common. There will be issued $2,500,000 of preferred stock and $5,500,000 common. The company will be organized under the laws of the state of Delaware, and has acquired the following properties: The Home Light, Heat and Power Company, of Pittsburg, Kan.; The United Gas Company and the Edison Light and Power Company, of Wichita, Kan., and the Astoria Electric Company, of Astoria, Ore. Negotiations are now pending for several other important western properties, the acquisition of which, when accomplished, is expected to increase the earnings of the company materially. The new company will commence business with a cash working capital of at least $500,000. The gross earnings of the four companies above mentioned for the year ended May 31, 1909, were $777,481. Gross earnings for the current fiscal year are estimated at over $1,000,000.

LIGHTING AND POWER.

(Special Correspondence.)

GREENVILLE, S. C.—The Monaghan Mills will shortly be using both electricity and steam power. This company has been operating with a 2,000-horsepower engine, and is installing an electric drive with electricity furnished by the Greenville transmission lines of the Southern Power Company, of Charlotte, N. C. The Monaghan company has contracted with the Southern management for secondary power, and its mill will at times be operated by electricity and by steam. About $30,000 is the cost of the electrical installation. The company is also arranging to furnish electric lighting in the streets and houses of its village.

ROCK HILL, S. C.—R. T. Fewell, the present manager of the Rock Hill Water, Light and Power Company, recently sold at a receiver's sale to Philadelphia capitalists, announces that a charter will be asked by himself and P. A. Wilcox, Florence, S. C., for the Rock Hill Lighting and Water Company, books of subscription to be opened at once.
L.

WESTBORO, MASS.—The Westboro Gas and Electric Company has found that it would cost a good deal to keep up the efficiency of its plant, and so has closed a deal whereby the Westboro Gas and Electric Company will receive its electricity from the Connecticut River Power Company, through the Marlboro Electric Light Company. The right to erect poles and string wires has been granted by the Westboro Selectmen, and Northboro and the State Highway Commissioners. The work of making the connections was started September 25.

ATHOL, MASS.—The State Gas Commissioners have given a hearing on the petition of the Athol Gas and Electric Light Company for authority to issue 1,748 shares of additional capital stock of the par value of $100, for the purpose of raising money to be applied to the payment liabilities incurred for buying additions to the plant. The additional stock, if approved by the Commission, is to be offered to stockholders of the Athol company of record August 24, 1909, at $100 per share. There was no opposition and the Commission took the matter under advisement.

NEBRASKA CITY, NEB.—A new corporation, known as the Nebraska City Light and Power Company, has been formed and the articles of incorporation have been filed with the county clerk. It has a capital stock of $100,000 and the shares are $5,000 each, of which 20 per cent was paid in at the time of the adopting of the articles of incorporation. The incorporators are E. K. Bradley, H. H. Hanks, J. F. Johnson, Walt McNamara, Fred E. Johnson, A. G. Hastie and G. E. Hanks. They are all well-known capitalists of this city, and most of them are stockholders in the King Falfa Company, at which plant the power house is situated.

FREDERICK, MD.—At a public meeting of citizens of Thurmont, in the interest of lighting the town with electricity, it was decided to form a corporation and build an electric lighting plant. It is the purpose of the Town Council to get power by an act of the legislature to issue bonds for the payment of the plant, after which it will be turned over to the town officials. The incorporators will include Col. John R. Rouzer, Peter N. Hammaker, J. W. Creager, M. A. Birely, L. N. Creager, L. S. Birely, L. R. Waeshe, Thomas E. Lycett, D. R. Rouzer, Charles Mackley, Senator J. P. T. Mathias and J. P. Waesche. Articles of incorporation are being prepared.

ASHLAND, PA.—The Mineral Railroad and Mining Company recently installed an electric plant at its Luke Fiddler colliery, at Shamokin, and now purposes to light all of its collieries from this plant. Arc lights have been placed at the Hickory Swamp colliery and the electricity is about ready to be turned on. Arc lights will be placed about the outside workings of all of the company's collieries, and the colliery offices will be lighted with electricity from this plant. The company has its own telephone system and the light wires will be strung on the telephone poles. It is likely that the company will commence to light with electricity the homes about its collieries.

HICKORY, N. C.—The transmission lines of the Southern Power Company will be completed to Hickory, about 125 miles from the generating plants, by November 1, according to present calculation. The Thornton Light and Power Company will handle 400 horsepower from the Southern Power Company, using 150 in its own plant, and using the remainder for distribution among numerous industries of the town and vicinity. The Thornton Company will control the power only within the city limits, and outside, where a number of larger industries are located, the Southern Power Company will have full sway. Colonel Thornton, of the local company, declares that he now has in sight the money for developing a waterpower on the Catawba near Hickory, from which he proposes to supply several smaller towns to the north of Hickory with electricity.
L.

FREDERICKSBURG, VA.—President W. C. Whitner, of the Fredericksburg Power Company, has returned from New York, where he was in consultation with Mr. Gould in reference to the Gould interests at this city. The result is that developments on an extensive scale are to begin here at once. A large force of hands has been started crushing stone to be used in the construction of the power house of the company to be erected in this city. This will require 6,000 yards of the crushed stone. The stone to be used will be taken from the quarries on both sides of the Rappahannock River, one mile above this city. The ground for the power house will be broken as soon as the material to be used for its construction can be got together. The site is between Main Street and the river front at the foot of

Factory Street, which intersects Main Street. The new dam of the company has been completed at great expense and is in use, the old dam having been abandoned. It is expected that the electric railroad line will be extended from Ashland to this city and on to Washington as soon as the power house is completed.

LIMA, OHIO—The much-talked-of project of harnessing the Sandusky River at Ballville near Fremont has finally become a reality and work will soon be started on the job. The Fremont Power and Light Company is financing the scheme and has let the contract to Engineer Robert H. Lysle, of Chicago. Mr. Lysle has arrived at Fremont and is busy getting things in readiness to begin operations. The work will cost in the neighborhood of $600,000 and will be finished within three months if a large force of men are employed. The dam will be of reinforced concrete and will be about 260 feet in length at the base. The structure will be twenty-seven feet in height.

LOUISVILLE, KY.—What is expected to prove a thoroughly up-to-date power house is to be erected by the Louisville Street Railway Company as an addition to the power plant at Campbell and Logan streets. This official statement has been made by T. J. Minary, president of the railway company. The project was approved some weeks ago and work has already started on the structure, which will involve an expenditure of more than $70,000. According to the specifications accepted for the new building, it will cover an area of sixty by 110 feet and will be one story in height. The building itself will cost about $20,000, to which will be added more than $50,000 for modern machinery.

SAGINAW, MICH.—Since the articles of the eighteen big power companies of Michigan were filed with the secretary of state at Lansing last week the subject has been debated here as to whether the Saginaw River, the Tittabawassee and the Cass rivers, all streams in this vicinity, could develop enough of a force in their waterfall to generate power as do the Muskegon, the Grand and the Au Sable rivers. Engineers have investigated the conditions in this vicinity with a view to harnessing the streams that traverse this country. The investigators find in most instances the waterfall is not enough and that the generation of power from local sources is in all probability impracticable.

CARTERSVILLE, GA.—United States Army engineers have begun surveys and borings for proposed storage reservoir on Etowah River, near Cartersville; dam to be 160 feet high, with storage capacity of 35,000,000,000 cubic feet of water, thus storing excess water during rainy seasons, preventing flood and equalizing flow of river during dry periods; electrical control planned for regulating amount of water to pass through dam; estimated cost $3,000,000, to be expended by United States Government, it being proposed this amount be refunded by various water-power companies deriving benefits from increased power value of river; earth and concrete construction proposed for dam; no construction to be undertaken until approval by Congress; Capt. H. B. Ferguson, Montgomery, Ala., can probably give information.

OGDEN CITY, UTAH—The Telluride Power Company has been replacing its power lines between Salt Lake City and Logan Canyon, a distance of seventy miles, with a double line constructed of steel towers and wooden towers. The steel tower line has been completed between Salt Lake City and North Ogden Canyon, a distance of forty miles. This line will support one circuit of three 115,563-circular-mil stranded copper cables and will be insulated for 60,000 volts. The towers are set upon cement bases and are spaced from 200 to 950 feet apart. This line when fully completed will be one of the finest transmission lines in the West. Parallel to the steel tower line a line made of wooden towers, composed of two poles, is in course of construction. This line will support one circuit of three 181,500-circular-mil aluminum wires. N.

UTICA, N. Y.—The appraisers of the property of the various Hudson River power corporations, which are now in bankruptcy, have filed their report in the United States District Court. The total appraisal of the property is $7,117,093.02, as follows: Hudson River Electric Power Company, $852,803.89; Madison County Gas and Electric Company, $150,634.69; Ballston Springs Light and Power Company, $56,024.29; Saratoga Gas, Electric Light and Power Company, $443,101.98; Empire State Power Company, $357,654.73; Hudson River Power Transmission Company, $681,199.21; Hudson River Water Power Company, $3,049,642.40; Hudson River Electric Power Company, $1,526,037.03. The power house at Mechanicville owned by Hudson River Power Transmission Company is appraised at $390,642 and the Spier Falls plant owned by the Hudson River Water Power Company at $1,831,700.

ST. LOUIS, MO.—Plans are being formed for the consolidation of several Missouri electric companies. To this end the Empire District Electric Company is being incorporated under the laws of Kansas, with $6,000,000 authorized capital, of which $4,000,000 will be common and $2,000,000 preferred stock. The new company will take over the properties of the Consolidated Light, Power and Ice Company, of Joplin; Joplin Light, Power and Water Company, the Galena Light and Power Company and fifty-seven per cent of the stock of the Spring River Power Company. The new company will make a bond issue of $6,000,000, of which $1,250,000 will be issued at once. Already plans have been completed for the erection of a large electric power plant on Spring River near Joplin. The capacity of the present plant at that point is now 10,500 horsepower, but this will be more than doubled.

EAST TAWAS, MICH.—Articles of association of the following companies have been filed in the office of the county clerk of Iosco County: Cooke Hydro-Electric Generating Company, Thompson Hydro-Electric Generating Company, Rogers Hydro-Electric Generating Company, Loud Hydro-Electric Generating Company, Five Channels Hydro-Electric Generating Company. These companies are all organized with the same stockholders, viz.: Edward F. Loud, H. Kimball Loud and L. A. Wood, of New York, the two former each holding one share of stock, and the latter 998 shares, except in the case of the Five Channels Company, which is incorporated with a capital stock of $50,000 and shares numbering 500, of which L. A. Wood holds 498 shares. There have also been filed articles of incorporation of the Iosco Land Company by Henry F. Loud, E. F. Loud, H. Kimball Loud, Zenas C. Eldred, for himself, and as trustee.

SANFORD, ME.—A contract has been closed whereby the Portland Electric Light and Power Company is to furnish the Sanford Mills with electric energy to the extent of 2,000 horsepower from the electric station at West Buxton. At present the Portland company has machinery installed at the West Buxton plant to develop 3,000 horsepower on a full head of water. This is all sold in Portland at present, and the taking on of the new contract means that it is to develop its great waterpower privilege at Bonny Eagle. It is also said that the Portland company will install an auxiliary steam plant at West Buxton to assist in developing the necessary power when the water is low, as the contract is an ironclad agreement to furnish 2,000 horsepower at all times. At present the Sanford Mills have a contract calling for 1,600 horsepower from the Atlantic Shore Line Railroad, but this is conditional and only a part of the amount is furnished during the run of low water in summer.

ALBION, N. Y.—The property of the Albion Power Company, owners of the electric-light and gas plants in Albion, Brockport, Middleport, Waterport and Clark's Mills, was sold recently on a foreclosure sale by the People's Bank and Trust Company, of Passaic, N. J. Lucien H. Tyng, of Philadelphia, Pa., representing the bondholders' committee, was the purchaser, at $38,250, subject to various incumbrances. Since the organization of the Albion Power Company two issues of bonds, one for $75,000 and one for $200,000, were marketed, and the representatives of the purchasers, William Marcy, of Buffalo; John L. Romer, of Buffalo; Frank A. Dudley, of Niagara Falls; Albert Span, of Buffalo; Frederick W. Danforth, of Buffalo; Charles H. Roberts, of Brockport; C. L. Slanborough, of Oswego, and attorneys from Romeo were present at the sale. It is understood that the property was immediately transferred after the sale to A. L. Sweet, of Medina, who owns the Medina power plant, on condition that the sale is confirmed by the court.

CHARLOTTE, N. C.—The 4 C's Company has applied to the Board of Aldermen for the right to separate its gas and lighting business from its traction business, and desires to form the Charlotte Gas and Electric Company, to take over these departments of the 4 C's interests. The petition will probably be granted. The new company has been chartered for some months by E. D. Latta, president of the 4 C's Company, and associates. The same company is taking aggressive steps toward beginning work on a new car barn and will also soon build a short connection out First Street to bring its suburban Hoskins service into the city by a route that will cut out a grade railway crossing, and permit of the electric cars going under the railway tracks. The company has numerous improvements in view. As to the separation of the traction interests from the electric-light and gas interests, it is set forth by the company that such will greatly facilitate the issuance of bonds in the future. L.

LOS ANGELES, CAL.—Thirty-five thousand horsepower of electric energy, or within 1,000 horsepower of the entire amount of current consumed for power purposes in this city, has been made available for Los Angeles, Pasadena and a number of other towns of Southern California at 6 o'clock last night, by the resumption of service from the waterpower of the Edison Electric Company Kern River plant No. 1 after an interval of eight months. During this interval it has been made so permanently endurable by one of the greatest pieces of steel construction in America that the most expert hydraulic engineers pronounce it impervious to anything that can ever occur. This gigantic piece of constructive work has required the services of about 1,000 men, working night and day, for six months, and has been completed at a cost of approximately $300,000 for labor and material and an additional $200,000 for the production of power to take the place of the Kern River power during the period that the repair work was in progress, making a total expenditure of half a million dollars.

ELECTRIC RAILWAYS.

(Special Correspondence.)

CLAREMONT, CAL.—The City Council has awarded to the Ontario & San Antonio Heights Railway Company a fifty-year franchise for an electric railroad in this city.

WARSAW, IND.—The report that the Murdock syndicate had leased the Winona Interurban system is denied by C. O. Johnson, vice-president of the Winona Company. S.

SANTA BARBARA, CAL.—The City Council will receive bids up to October 21 for a street-railway franchise applied for by the Santa Barbara Consolidated Railway Company.

MARSHFIELD, ORE.—The Coos Bay Electric Railway Company has been incorporated here, with a capital stock of $150,000, by J. H. Flanagan, C. F. McColl and W. S. Chandler.

NORTH YAKIMA, WASH.—Manager Richards, of the street railway, has placed an order for $50,000 worth of equipment and will at once begin construction of five miles more of track west of the city.

WOODBURN, ORE.—The City Council has given the Oregon Electric Company a franchise to operate electric cars on the streets of Woodburn, with the provision that construction work begin in two mouths. U.

CINCINNATI, OHIO—A survey is being taken on the new electric road, which is to operate between this city, Lexington, Ky., Louisville, Ky., and Maysville, Ky. The road will cost in the neighborhood of $3,000,000.

TOLEDO, OHIO—The Riggs & Sherman Company, of Toledo, has been engaged to make the preliminary surveys for a proposed traction line between Columbus and Cincinnati. The company has not yet been organized and it is not known who is back of the project. H.

LOS ANGELES, CAL.—The Edwards & Wildey Company and others have made application to the Board of Supervisors of this county to have offered for sale an electric-railway franchise on Melrose Avenue from Heliotrope to Seward. Bids for the franchise will be received up to November 8.

OREGON CITY, ORE.—F. N. Swift, who is promoting the construction of an electric railway between this city and Silverton, has secured traffic arrangements with the Portland Railway, Light & Power Company to take charge of his freight and passenger business between Oregon City and Portland.

MONTREAL, QUE.—A project for the consolidation of the Quebec Railway and Light Company and the other electric-lighting and power companies of the city of Quebec is being discussed. As a result Quebec Railway stock during the past few days has advanced from 57 to 68, later reacting to 63.

VANCOUVER, WASH.—The Tum Tum Mountain Railway Company has been incorporated for the purpose of building an electric railway from Tum Tum Mountain through Chelatchie Prairie, Amboy and La Center to Riggfield. E. M. Marsh is president; P. O. Hilstrom, treasurer, and F. R. Whelan, secretary of the company.

TACOMA, WASH.—The Skagit, Cascade & Chelan Railway Company has been incorporated at this place by W. E. Everett, A. M. Richards, George Senoir and C. E. Phoenix, with a capital stock of $25,000,000, to build an electric railway from Rockport, via Lake Chelan, to Spokane. Power for the operation of the line will be generated at Thunder Mountain. The head offices of the company will be located at this place.

TOLEDO, OHIO—The Toledo & Findlay Railway Company has just secured articles of incorporation. The capital stock authorized is but $10,000, which it is thought will be increased. Incorporators were B. L. Kilgour, Anthony B. Dunlap, Morris McGrew and Frank H. Simpson. It is said that the new company will take over and consolidate the Toledo Urban & Interurban, and the Toledo, Bowling Green & Southern. The former was sold at receiver's sale in August. H.

FORT WORTH, TEX.—The Fort Worth, Mineral Wells and Western Railroad Company, composed of Fort Worth and Arkansas capitalists, contemplate constructing an electric interurban line between Fort Worth and Mineral Wells, Tex., a distance of sixty miles. This line will be the first division of a railroad between this city and Roswell, N. M., a distance of about 375 miles. The remainder of line will be operated by steam. Paul Gurley and L. C. Cole of Fort Worth are the principal stockholders in the company. D.

INDIANAPOLIS, IND.—The Indiana Railroad Commission in the case of the Pennsylvania Railroad Company against the Indianapolis, Columbus & Southern Traction Company, wherein the steam line evoked the power of the Commission to order a separation of the grade crossing of the two lines near South Port, has decided in the light of a recent court decision, holding that as the separation in question was not commercially practicable, the Commission would not order such separation since the court would review its action and quite likely adhere to its previous conclusion. The Commission, however, commended the Pennsylvania company for its efforts to abolish dangerous grade crossings with other railroads. The ruling is important to interurban lines since there is a disposition on the part of steam lines to force a separation of graded crossings with interurban lines, which calls for large sums of money. S.

SAN FRANCISCO, CAL.—It is announced from the office of Assistant Manager W. R. Scott, of the Southern Pacific Railroad Company, that bids will soon be asked for for eighty-four steel electric passenger coaches for use on the company's suburban lines on the east side of San Francisco Bay, which lines are now being electrified. The detailed plans for these cars have been completed by Electrical Engineer Babcock. Each car will be of steel throughout, will seat about 100 passengers and will be equipped with pantograph trolleys.

DAYTON, OHIO—The Dayton Street Railway Company has increased its capital stock $300,000 to meet the expense due to the proposed construction of a new northerly and southerly line extending from Athletic Park to Carrmont. This action was taken by the directorate before the franchise was secured from the City Council, though the right to build south of the city to Carrmont has been obtained from the County Commissioners. The Dayton Street Railway Company began the operation of its line about five months ago and it was successful from the start.

LANSING, MICH.—Articles of incorporation of the Detroit, Lansing & Grand Rapids electric line have been filed and a mortgage for $5,000,000, to secure a bond issue of equal amount, filed at the office of the Wayne County register of deeds. The Union Trust Company is trustee under the mortgage. Officers of the new road, as given in the articles, are: President, Dr. Oliver H. Lau; vice-president, Henry M. Wallace; secretary-treasurer, George Valentine. Plans of those interested contemplate the beginning of active construction work in the spring. It is the intention to build the line from Farmington to Lansing first.

LOGANSPORT, IND.—The South Bend & Logansport Traction Company, recently incorporated to build the proposed interurban railroad connecting South Bend and Logansport, Ind., has been given a franchise to operate in St. Joseph County by the County Commissioners. The contract, signed by the commissioners and officers of the company, provides that cars shall be in operation by June 1, 1911. Work must be started at once, according to the terms of the agreement. The new road will enter South Bend via South Michigan Street. South of the city limits the tracks will pass from the center of the street to private right-of-way. The line will parallel the tracks of the Vandalia Railroad to Marshall County line, crossing Center and Union townships.

PEORIA, ILL.—An application to increase the capital stock of the Illinois Traction System has been made at Augusta, Me., where the company was incorporated. The stock will be increased from $13,000,000 to $16,000,000, two-thirds common and one-third preferred. A number of improvements are in view, but the principal one is the extension north from Peoria to reach either the Joliet electric line or the Aurora, Elgin & Joliet, either one of which would give a connection direct to Chicago and would mean an electric line clear through from Chicago to St. Louis. The construction of belt lines about the cities of Springfield and Decatur and the rebuilding of some of the local street car lines and some of the lighting plants that the company owns are also contemplated. V.

TOLEDO, OHIO—The Toledo, Bowling Green & Southern Electric Railway has at last secured an entrance into Toledo over lines of its own. It has been operated into this city over the lines of the Toledo Urban and Interurban Electric heretofore, under a lease, which will probably be canceled. The company this week, acting through Henry Gibson, of Cincinnati, bought the property of the T. U. & I. from Special Master Harry W. Lloyd, who sold the holdings to satisfy the claim of the Union Savings and Trust Company. The consideration named was $400,000. It is understood that the old bondholders of the T. U. & I. company will exchange their holdings for bonds of the other concern, as soon as the sale is confirmed by the court, which will be about September 20. It is said that the line will eventually be extended on to Cincinnati from Findlay. H.

ATLANTA, GA.—The interurban trolley road between Atlanta and Macon will now be built and built immediately. The passage of a bill by the senate during the last hours of business made the road possible and President W. Jordan Massee announces that work will start as soon as the formalities of getting the money are completed. The bill referred to corrects what New York lawyers for a big trust company thought was a fault in the Georgia law and makes possible the consolidation of the Central Georgia Power Company, the Macon Railway and Light Company and the Atlanta, Griffin & Macon Electric Railway Company—otherwise known as the Atlanta-Macon interurban. As soon as the legal arrangements can be made, the three companies will be consolidated into one large corporation and bonds to the amount of about $10,000,000 will be issued.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

TEKAMAH, NEB.—The Tekamah Telephone Company is preparing to rebuild its system.

TOWNER, N. D.—The county board has granted a franchise to the Towner Telephone Company.

KERKHOVEN, MINN.—A franchise has been granted to the Kerkhoven Telephone Exchange Company. C.

WHITE EARTH, MINN.—The White Earth Telephone Company will extend its line to Waubun and Ogema.

SCOTTS BLUFF, NEB.—The Dutch Flats Telephone Company has been incorporated, with a capital stock of $7,500.

McINTOSH, S. D.—The Corson County Telephone Company has been incorporated, with a capital stock of $25,000.

BROOKINGS, S. D.—The Brookings County Telephone Company has been incorporated, with a capital stock of $25,000.

ROUNDUP, MONT.—The Rocky Mountain Bell Telephone Company will probably build a telephone line to Kalispell. C.

HURON, S. D.—Construction has been commenced on a reinforced concrete exchange building for the Dakota Central. C.

APPOMATTOX, VA.—The Appomattox Telephone Company has amended its charter and increased its capital stock from $5,000 to $10,000. L.

CULBERTSON, MONT.—At a special meeting of the directors of the Montana Star Telephone Company the material for the line to Glasgow was ordered and work will be commenced as soon as it is received. C.

KAMAS, UTAH—The Kamas-Woodland Telephone Company has incorporated, with a capital stock of $20,000. This company will furnish telephone service to the towns of Woodland and Kamas and district surrounding. N.

WASHINGTON, N. C.—The Western Electric Company is installing the interior work and new switchboard requirements of the renovated telephone system here, while the outside work is being done by the Carolina Telegraph and Telephone Company. L.

SNOW HILL, N. C.—The East Carolina Electric and Realty Company has been chartered here, with a capitalization of $25,000, for the purpose of constructing telegraph or telephone lines, the interested parties including S. L. Lynch, Kingston, N. C.; W. H. Wells, Snow Hill, and others. L.

GREEN BAY, VA.—The rapid growth of the rural telephone system in the state continues. The last reported addition is the putting in of a line bringing a number of farmers in this section in touch with the toll lines of the Southern Bell Telephone Company at this place. L.

SALISBURY, N. C.—After a lengthy fight the town has granted a franchise to L. D. Coltrane, of Concord, and J. F. Hayden, of High Point, to install a number of long-distance stations, Salisbury to be the central point for independent exchanges at High Point, Lexington and half a dozen more towns of from 2,000 to 10,000 population. L.

ROCHESTER, N. Y.—The Rochester Telephone Company, an organization not controlled by the Bell corporations, has been granted by the Common Council of this city permission to increase telephone rates for business telephones from $48 to $60 a year. The telephone company had a contract with the city precluding a raise in rates which the Council has officially waived.

CHARLES CITY COURT HOUSE, VA.—The Charles City Telephone Company, which has been in operation for some time, has been formally incorporated, with H. S. Saunders, president; L. M. Nance, secretary-treasurer, and Dr. Ashton Harwood, vice-president. The company has put in telephones along the line of the company from Roxbury to Granville, while other extensions are contemplated. L.

TOLEDO, OHIO—Robert R. Lysle, formerly of Toledo, now of Chicago, has been awarded the contract for the erection of a $600,000 power plant, which is to be built near Fremont, Ohio, at the village of Ballville. The present plans of the Fremont Power and Light Company, which was incorporated four years ago and has been working on the big project ever since, contemplates the harnessing of the waterpower in the Sandusky River, to furnish electricity from a powerhouse with a capacity of 2,500 horsepower. It is said the scheme is being backed by Cameron & Company, of Chicago. Other plans of the concern include two electric railway projects. A massive concrete dam thirty-six feet thick at the base and 260 feet in length will be constructed across the river. The water from the dam will be carried to the powerhouse through an immense steel pipe, fourteen feet in diameter and 3,000 feet long, with a fall of forty-two feet from the dam to the powerhouse. H.

ELECTRICAL SECURITIES.

The expectation of tightening money conditions still overshadows anything else in the stock market. It is not thought that there will be any particular advance for some little while to come and transactions have during the past week narrowed a good deal, compared with a week or two ago. Electrical securities continue to gain in favor, and it may be remarked that there is a tremendous volume of stock issues of this kind being offered to and absorbed by the general public. In another part of this paper an interesting statement of the amount of industrial securities put out so far during the year as compared with the previous year is printed.

Chicago Railways earnings for October increased $5,000 daily the first week, indicating a record month. October 2 was the record day with $40,000.

The annual meeting of the shareholders of the Manhattan Railway Company will be held in New York city, November 10, at noon. Transfer books will close October 9 and reopen November 11.

Application has been made to the New York Stock Exchange to list the following securities: Westinghouse Electric and Manufacturing Company $2,720,000 ten-year five per cent collateral notes, due 1917. Keystone Telephone Company $1,443,000 first mortgage five per cent bonds, due 1935.

Gross earnings of Interborough Rapid Transit, for September, increased about $10,300 per day, or $310,000 for the month, making the largest month's gain in the company's history. For the quarter ended September 30, Interborough Rapid Transit Company's earnings increased approximately $800,000, which is nearly fifty per cent of the entire $1,616,093 increase for the fiscal year ended June 30 last. The September increase was, of course, made possible by the enormous riding incident to the Hudson-Fulton celebration.

Proxies are asked by the majority of the Commonwealth Edison directorate for the special meeting, November 8, to increase the stock $10,000,000 to $40,000,000 by an issue of stock at par to stockholders. The Commonwealth Edison annual meeting occurs November 8. The reason for the special meeting on the same day is the new provision in the Illinois corporation act requiring a special meeting for such action. Governor Deneen has vetoed this measure, but lawyers question the validity of his veto. The Commonwealth Edison Company's new stock issue will probably amount to $3,000,000, in quarterly payments, to begin early next year.

Subscription to the $12,500,000 four-and-one-half per cent thirty-year first mortgage bonds of the New York Telephone Company offered in this country by Kidder, Peabody & Company, of Boston and New York, have been with the issue heavily oversubscribed. The offering price was 95 and interest, a 4.80-per-cent income basis.

The annual meeting of the stockholders of the Allis-Chalmers Company will be held on November 4. Books close October 14 and reopen October 18.

H. T. Scott, president of the Pacific Telephone and Telegraph Company, states that "while the company is doing well, its business constantly improving, there is no reason to expect any dividend on the common stock for several years," and added he knew of nothing in the situation that would explain or justify the advance which has taken place in the price.

Application has been made to list $1,600,000 of the $2,000,000 outstanding common stock of the Ottawa Light, Heat and Power Company on the Montreal Stock Exchange. The stock pays six per cent dividends, and it is expected that seven per cent will be commenced January 1, 1910.

DIVIDENDS.

Brooklyn City Railroad Company; regular quarterly dividend of two-and-one-half per cent, payable October 15.

Mexican Telephone and Telegraph Company; semiannual dividend of two-and-one-half per cent on preferred stock, payable November 1.

Ottumwa Railway and Light Company; quarterly dividend of one-and-three-fourths per cent on preferred stock, payable October 15.

NEW YORK.	Oct. 11.	Oct. 4
Allis-Chalmers common	14½	15⅝
Allis-Chalmers preferred	52½	54¼
Amalgamated Copper	81⅛	84
American Tel. & Cable	*80	*80
American Tel. & Tel.	142½	142¼
Brooklyn Rapid Transit	78½	80½
General Electric	164	167
Interborough-Metropolitan common	15½	16½
Interborough-Metropolitan preferred	47½	50¼
Kings County Electric	128	135
Mackay Companies (Postal Telegraph and Cables) common	91¾	93¼
Mackay Companies (Postal Telegraph and Cables) preferred	73	75½
Manhattan Elevated	142	142
Metropolitan Street Railway	20	20
New York & New Jersey Telephone	123½	120
U. S. Steel common	87¼	92⅞
U. S. Steel preferred	127	130¼
Western Union	76½	78¾
Westinghouse common	86	87⅛
Westinghouse preferred	138	140

*Last price quoted.

BOSTON.

	Oct. 11.	Oct. 4
American Tel. & Tel.	142½	142⅛
Edison Elec. Illuminating	252	..
General Electric	164	167
Massachusetts Electric common	17	18¼
Massachusetts Electric preferred	80½	81½
New England Telephone	135	..
Western Tel. & Tel. common	10¾	10½
Western Tel. & Tel. preferred	89	..

PHILADELPHIA.

	Oct. 11.	Oct. 4
American Railways	46	45¾
Electric Company of America	12⅛	12⅛
Electric Storage Battery common	59½	60¾
Electric Storage Battery preferred	59½	60¾
Philadelphia Electric	12½	12½
Philadelphia Rapid Transit	28	29
Philadelphia Traction	90	90
Union Traction	53¼	53½

CHICAGO.

	Oct. 11.	Oct. 4
Chicago Railways, Series 1	108	108
Chicago Railways, Series 2	36	36
Chicago Subway	5¼	7¼
Chicago Telephone	..	138
Commonwealth Edison	120	120
Metropolitan Elevated common	15½	15
Metropolitan Elevated preferred	50½	51
National Carbon common	97	97
National Carbon preferred	118	118

PERSONAL MENTION.

HENRY M. BYLLESBY, president of H. M. Byllesby & Company, consulting engineers, was elected president of the Civic Federation of Chicago and chairman of its executive committee. B. E. Sunny, president of the Chicago Telephone Company, is also a member of this committee.

W. E. WICKENDON, formerly senior instructor in the electrical engineering department at the Wisconsin University, has been appointed assistant professor of electrical engineering at the Massachusetts Institute of Technology to succeed Associate Professor G. E. Shaad, lately resigned to accept the chair of the electrical department at the University of Kansas.

HARRY J. VANCE, of St. Louis, has accepted a position with the Illinois Traction Company and will have his office at the general offices of the company at Peoria. His official title will probably be that of general superintendent, a new office. Mr. Vance was formerly with the Traction Company in the claim department, but more recently in the construction department at St. Louis.

FRANK VAIL BURTON, of Bridgeport, Conn., and Miss Marion Andrew, daughter of Mr. and Mrs. Thomas Winter Andrew, of Swarthmore, Pa., were married in the Walnut Street Presbyterian Church in Philadelphia on Saturday afternoon, October 9. Mr. Burton is well known to the jobbing trade, especially throughout the East, in his capacity of eastern sales manager of the Bryant Electric Company and the Perkins Electric Switch Manufacturing Company. Mr. and Mrs. Burton will make their home in Bridgeport.

THOMAS A. BANNING, JR., who for the last two years has been associated with the Board of Supervising Engineers, Chicago Traction, has joined the technical staff of Banning & Banning, patent attorneys and counselors, at their offices in the Marquette Building, Chicago. Mr. Banning is a graduate from the electrical engineering department of Armour Institute of Technology and will devote himself largely to patent causes involving electrical features. He is a young man of exceptional ability and should prove a most valuable adjunct to the staff of this long-established firm.

PROPOSALS.

POST OFFICE, BELLEVILLE, ILL.—The office of the Supervising Architect will receive sealed proposals November 16 for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the United States Post Office at Belleville, Ill., in accordance with the drawings and specification, copies of which may be had from the custodian of site at Belleville, Ill., or at the Supervising Architect's office.

POST OFFICE, NORTH ADAMS, MASS.—The office of the Supervising Architect will receive sealed proposals November 4 for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the U. S. Post Office at North Adams, Mass., in accordance with drawings and specification, copies of which may be had from the custodian of site at North Adams, Mass., or at the Supervising Architect's office.

FORT DODGE, IOWA—The office of the Supervising Architect, Washington, D. C., will receive sealed proposals until November 11 for the extension, remodeling, etc. (including plumbing, gas piping, heating apparatus, electric wiring and conduits and standard clock system), of the U. S. Post Office at Fort Dodge, Iowa, in accordance with the drawings and specification, copies of which may be had from the custodian of site, Fort Dodge, Iowa, or at the Supervising Architect's office.

NEW HAVEN, CONN.—The office of the Supervising Architect, Washington, D. C., will receive sealed proposals until November 15 for the construction (including plumbing, gas piping, heating apparatus, electric conduits, wiring and lift) of an extension, remodeling, etc., to the United States Post Office and Custom House, New Haven, Conn., in accordance with drawings and specifications, copies of which may be obtained from the custodian at New Haven, Conn., or at the Supervising Architect's office.

NEW PUBLICATIONS.

PROSPECTUS OF THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES—The prospectus of the Brooklyn Institute of Arts and Sciences for the year of 1909-1910 has recently been issued. It contains a complete list of courses, studies taken up and members of the faculty. Also a programme of the lectures to be delivered during the ensuing year.

ENGINEERING COLLEGE, UNIVERSITY OF MINNESOTA—The College of Engineering and the Mechanic Arts, University of Minnesota, has published a bulletin, announcing its various engineering courses for 1909-1910. There are given thorough courses in electrical, mechanical, civil and municipal engineering, and a general course in science and technology. The bulletin that describes these courses in detail has eighty pages. Copies may be obtained from the registrar of the University of Minnesota, Minneapolis, Minn.

NEW MANUFACTURING COMPANIES.

ST. LOUIS, MO.—The Rex Electric Company has been incorporated, with a capital stock of $50,000, to manufacture electrical appliances.

ALBANY, N. Y.—Leone Electrical Improvement Company, Manhattan. General contracting, electrical work; capital, $50,000. Incorporators: P. Leone, J. Coggiano, A. Castelli, F. Suriani, New York city.

PORTLAND, ME.—The International Electrical Manufacturing Company has been incorporated. Electrical machinery; capital $1,000,000. President, C. E. Eaton; treasurer, T. L. Croteau, Portland.

NEW YORK, N. Y.—The New Lamp Company, of Manhattan, N. Y., has been incorporated to manufacture lamps, lanterns and lighting devices. Capital, $50,000. Incorporators: Frederick C. Tompkins, Henry Heinemeyer, Thomas Butt, New York city.

FORT WAYNE, IND.—The Fort Wayne Manufacturing Company has filed articles of incorporation, with the object of establishing a plant for the manufacture of electrical machinery and supplies of all kinds. The capitalization is $10,000. F. L. Dulin, A. L. Sopshire, W. M. Fay and Perry Crawford, directors. S.

LEGAL NOTES.

AUTHORITY REQUIRED FOR MUNICIPALITY TO CONTRACT FOR OR FIX RATES—The Supreme Court of the United States says, in Home Telephone and Telegraph Company vs. City of Los Angeles, 29 Supreme Court Reporter, 507, that it has been settled by this court that the state may authorize one of its municipal corporations to establish, by an inviolable contract, the rates to be charged by a public service corporation (or natural person) for a definite term, not grossly unreasonable in point of time, and that the effect of such a contract is to suspend, during the life of the contract, the governmental power of fixing and regulating the rates. But for the very reason that such a contract has the effect of extinguishing pro tanto (to that extent) an undoubted power of government, both its existence and the authority to make it must clearly and unmistakably appear, and all doubts must be resolved in favor of the continuance of the power.

SUBSCRIBER TO MUTUAL COMPANY WITHOUT POWER TO COMPEL CONNECTIONS—The Ivanhoe Furnace Company, a stockholder or subscriber in the Wythe Mutual Telephone Company, presented a petition praying that a peremptory writ of mandamus be issued, directed to the Virginia & Tennessee Telephone Company, commanding and compelling it, among other things, to connect its lines and exchange service with the Wythe Mutual Telephone Company upon the same terms and conditions as it at that time connected with the Wytheville Telephone Company. The Supreme Court of Appeals of Virginia, however, holds, Ivanhoe Furnace Company vs. Virginia & Tennessee Telephone Company, 63 Southeastern Reporter, 426, that the plaintiff had no right to implead the defendant company upon the issues sought to be litigated by its petition. The plaintiff's status was merely that of a subscriber and patron of the Wythe Mutual Telephone Company, and in those relations it was entitled to demand of that company the same service that it rendered to other patrons of the same class, and none other. So, also, it could only require of the defendant company the use of its system in like manner and upon the same terms that it accorded to the public generally. The plaintiff was in no sense the repre-

sentative of the Wythe Mutual Telephone Company, and possessed no authority whatever to dictate to that company, or to the defendant company, what physical connections they should make or what regulations they should adopt, if any, for the interchange of business. These were matters of business policy to be determined by the companies for themselves, subject only to the visitorial authority of the state.

RELATION OF MUNICIPALITIES TO PUBLIC UTILITIES—The Court of Appeals of Kentucky says, in Louisville Home Telephone Company vs. City of Louisville, 113 Southwestern Reporter, 855, that in this day efficient telephone service is so essential, not only in the conduct of private business in the cities, as well as in the rural districts, but is also so important in the management and conduct of the business and government of cities, that its proper installation, maintenance and service constitute a matter of decided public interest. Again the court says that because of their potency and usefulness in promoting and preserving the health, security and comfort of the public, and of the aid they afford in the conduct of the business and administration of the municipality itself, such utilities as water, light, and telephone service have long been regarded as essential governmental agencies and important aids to the police power. A municipality has the power and right to erect, maintain and operate plants, and use the public streets for furnishing such utilities for the municipality itself and to its inhabitants. Such power or duty it may discharge by having others perform them for it upon such terms as may be agreed upon in the form and manner prescribed by law. What is commonly termed the "granting" of a franchise by a city for one of these public utilities is therefore in the nature of a contract by the city with the grantee for the performance of a public service.

HEADLIGHT REQUIREMENTS FOR ELECTRIC CARS ON PUBLIC HIGHWAYS—The Supreme Court of Errors of Connecticut says, in the case of Currie vs. Consolidated Railway Company, 71 Atlantic Reporter, 356, that the use of a highway for electric street cars imposes no new servitude upon the soil. It is simply a new form of the original use. The owner of the car in running it is therefore governed by the same rules which apply to the management of any other vehicles. Being of greater size and weight than they commonly are, and capable of being moved at a very high rate of speed, the car must at all times be kept so well in hand as not to expose others to unreasonable hazard. When running at night, the car must be provided with such means of illumination as may be requisite, to enable the motorman to see far enough ahead to do whatever ordinary care may demand in order to avoid a rear-end collision with any other vehicle upon the railway track. The speed at which any vehicle can be driven over a highway at night must be determined partly in view of the distance ahead at which travelers upon or approaching the same highway would become visible. A street-railway company is not necessarily bound, as respects other travelers, to equip its cars with a particular kind of light, known, used and approved by those engaged in conducting the same business under like conditions. It may be using one that is much better. But evidence of what they commonly do and approve in that respect has a legitimate and not unimportant tendency to show that ordinary care would call for its conformity to an established practice.

INDUSTRIAL ITEMS.

THE AMERICAN BLOWER COMPANY, Detroit, Mich., has recently distributed a folder containing convincing arguments for prospective customers of its engines.

WASHBURN & GRANGER, 120 Liberty Street, New York, N. Y., is distributing catalogue "B," descriptive of Dean grates. This catalogue contains valuable information for anyone interested in the subject.

THE PACIFIC ELECTRIC HEATING COMPANY, Ontario, Cal., and Chicago, Ill., has issued the September number of its monthly publication, "Hot Points," which is devoted principally to the "El Tosto" toaster, manufactured by this company.

THE GOODWIN & KINTZ COMPANY, Winsted, Conn., has distributed a supplement to be used in connection with its catalogue No. 31. This supplement contains illustrations, description and prices of portable electric lamps fitted with highly artistic shades.

THE CENTRAL ELECTRIC COMPANY, Chicago, Ill., is distributing a new folder, entitled "Economy," and describing the Manson and Okonite tapes. The full directions given for making joints should render this booklet of considerable value to those called upon to do this class of work.

PASS & SEYMOUR, INCORPORATED, of Solvay, N. Y., announce a number of changes in the personnel of their sales department that were effective October 1. W. Brewster Hall has been promoted to the position of assistant sales manager, with headquarters at Solvay. The New York city office, at 39 Cortlandt Street, has been placed in charge of F. S. Baldwin, late of the Syracuse Supply Company. Mr. Baldwin has been engaged in the electrical jobbing business for the past five years, and so brings to the company the benefit of his experience from the distributor's standpoint.

THE THORDARSON ELECTRIC MANUFACTURING COMPANY, Chicago, Ill., has issued a folder and price list describing its various lines of small-capacity alternating-current transformers, for operating fans, small motors, miniature electric-railways, buzzers, induction coils, etc., lighting small lamps, ringing electric bells, and the like.

THE CENTRAL ELECTRIC COMPANY, of Chicago, is distributing several new flyers descriptive of dry batteries. These batteries are intended for open-circuit service and are claimed to give maximum service with minimum cost, owing to the use of the highest grade of material, best methods of treatment and modern machinery used in their manufacture.

THE DETROIT FUSE AND MANUFACTURING COMPANY, Detroit, Mich., is distributing revised price lists on its line of "Arkless" indicating fuses. In addition to containing complete list prices on National Code standard fuses, these price lists call special attention to the absolute guarantee placed on every "Arkless" fuse, and to the special features embodied in this line.

THE TREGONING ELECTRIC MANUFACTURING COMPANY, of Cleveland, Ohio, owing to a largely increased business, has removed its plant from 224 High Avenue to 418 West Prospect Avenue. The new factory is equipped with much additional machinery and equipment for the manufacture of the Tregoning specialties, which has been made necessary as a result of the constantly growing demand for these products.

THE CENTRAL ELECTRIC COMPANY, Chicago, Ill., is distributing a number of timely circulars descriptive of electric toasters, and plug clusters suitable for use with electric fans, flatirons, curling-irons, etc. Also a number of circulars descriptive of multi-catch pull sockets, attachment plugs, and a new type of fiber hand portable. Copies will be sent upon request to the company.

THE EXCELSIOR INSULATED WIRE COMPANY, New York city, has issued a pamphlet entitled "Points and Prices on Excelsior Insulated Wire." This wire is made on the Randall system of insulation, which is the result of a series of experiments made over a period of several years in the production of a cotton insulation adapted to resist moisture and abrasion. Two styles are made, braidless and braid-covered. Both varieties have been personally recommended by satisfied users.

THE GENERAL INCANDESCENT LAMP COMPANY, of Cleveland, Ohio, has once more started the distribution of the G. I. series of girl pictures taken from life. It sent out a very attractive set of five last season at different intervals. If the first one for this year is any indication of what may be expected of the others that are to follow, they surely will be appreciated by the recipients. This is a very attractive form of advertising and many of the pictures will doubtless be hung permanently on office walls.

THE CHARLES L. KIEWERT COMPANY, New York city, has issued a folder giving particulars of the advantages, construction and operation of the "Economy" pure carbon arc lamp for direct current. This lamp is very artistic in appearance, gives a steady, pure white light, is economical in operation and has many advantages over the common form of enclosed arc lamp. A price list is appended. The same company has also recently issued a card descriptive of the "Aurola" flaming-arc lamp, which is one of the most powerful and economical flaming-arc lamps now on the market.

HENRY F. FROSCH & COMPANY, San Francisco, Cal., announce the removal of their office and warerooms from 656-658 Howard Street to the Electric Building, 171-173 Second Street. The company represents the following firms on the Pacific Coast, and carries stocks for immediate delivery: Federal Electric Company, Chicago, Ill.; General Incandescent Lamp Company, Cleveland, Ohio; Albert J. M. Anderson Manufacturing Company, Boston, Mass.; Minerallac Electric Company, Chicago, Ill.; Crescent Company, Valparaiso, Ind.; Excello Arc Lamp Company, New York, N. Y.

THE WESTINGHOUSE MACHINE COMPANY, Pittsburg, Pa., has secured a contract from the Detroit United Railways for an additional Westinghouse turbine unit. The new turbine, which is 1,000 kilowatts capacity and which is to operate at 150 pounds steam, twenty-eight inches vacuum and saturated steam, will be installed at the Rochester station on the Detroit and Flint division. This station already contains engine-type units, but extensions of traffic have necessitated the installation of this new turbine unit. The Westinghouse company has also received an order from the Potlatch Lumber Company for a 600-kolowatt Westinghouse exhaust-steam turbine, to be installed in the company's central power plant at Potlatch, Idaho. There are at present located in this plant one rope-driven Corliss engine and a 100-kilowatt high-speed triple engine driving a generator. The low-pressure turbine will take steam at about

fifteen pounds absolute from both of these units, and some other auxiliaries generating power for the operation of a new planing mill and box factory. Arrangements have also been made for the operation of this unit for lighting for the mill and the surrounding town. The equipment ordered also includes a Westinghouse-Leblanc condenser, designed for carrying a twenty-eight-inch vacuum.

ALLIS-CHALMERS COMPANY, Milwaukee, Wis., announces that with reference to rumors recently circulated, to the effect that large shop and foundry extensions are to be undertaken this fall by the Allis-Chalmers Company, it has been authoritatively stated by President W. H. Whiteside that no further additions to the West Allis Works are contemplated. However, an extension to the Cincinnati Works of the company is being made, which will give employment to about 1,000 additional men. Construction work and the installation of new equipment was commenced there some weeks ago.

THE AMERICAN DISTRICT STEAM COMPANY, Lockport, N. Y., has just published its Bulletin No. 115 on "The Financial Effect of Combining an Exhaust Steam Heating System with an Electric Light and Power Plant." This bulletin points out clearly the conditions favorable to central-station heating and the excellent returns from this class of business when properly conducted. Attention is also called to the benefits to central stations of district heating aside from the direct income, particularly in enabling them to provide light, heat and power for many patrons that would otherwise operate private isolated plants. The pamphlet also contains illustrated descriptions of many devices that make for efficiency in the heating installation.

THE ROCKWELL FURNACE COMPANY, New York, N. Y., has recently published a finely illustrated catalogue on furnaces and heating machines for manufacturing purposes, using any fuel. Among the devices illustrated are the following: Forging and dressing furnace, for oil or gas fuel; adjustable top slot forge, for oil or gas fuel; bench brazing forge, for oil or gas fuel; brazing table and forge, for oil or gas fuel; accurate temperature forging furnaces, for oil or gas fuel; rivet-heating furnaces, portable and stationary, for oil fuel, and for oil or gas fuel; wire brazing forge; tube brazing furnace; portable heater, compressed-air type (for crude or refined oil), and self-contained type (for kerosene oil); miscellaneous blacksmith forges, and many others.

THE INTERNATIONAL ACHESON GRAPHITE COMPANY, of Niagara Falls, N. Y., announces that another substantial and commodious building is to be added to its Niagara Falls, Ont., branch works. The structure is to be fifty feet wide by 105 feet long, and the contract has been awarded to W. S. Homan, of Niagara Falls, Ont. The facilities afforded by this addition will make the Canadian works of the Graphite Company quite complete in its ability to care for a rapidly-growing trade, made so by Canada's industrial growth. The building will contain a new grinding plant, in which the lubricating, electrotype and other grades of powdered graphite will be prepared for market. It will also contain a stock room for package goods, such as graphited greases, powders, etc., while a new shipping room will make it most convenient for promptly filling orders.

THE WESTINGHOUSE MACHINE COMPANY, East Pittsburg, Pa., has recently published Circular W. M. 503 on "Westinghouse Gas Producers," which is a notable contribution to the literature on the producer problem. The operation of the producer is convincingly explained with the aid of some fine illustrations, and a number of tests of the producer, with various kinds of coal and lignite for fuel, are given. The company expounds the producer problem in this publication with exceptional frankness, and no extravagant claims are made. Attention is drawn to the necessity for intelligent and thoughtful attention to the gas-producer plant, a statement which cannot be too well noted by prospective users, as the producer requires just as much skill for its efficient and economical operation as does the steam boiler. Anyone interested in the operation of the internal-combustion engine should possess a copy of this circular.

THE RELIANCE ELECTRIC AND ENGINEERING COMPANY (formerly the Lincoln Motor Works Company), Cleveland, Ohio, has recently issued Bulletin No. 101, entitled, "The Crank Shaper." This is the first of a series of bulletins dealing with the application of Lincoln variable-speed motors to different types of machine tools and gives very valuable information not only regarding the power required to drive crank shapers under different conditions of work, but also compares the productive efficiency of belt-driven and motor-driven shapers. A most valuable table is given on page 12, showing the power required for shaper drive for various sizes of machine. This table is divided into five sections, showing (1) average friction load in horsepower; (2) basis of classification for shaper duty, using cuts of various dimensions on cast-iron at an average cutting speed of forty feet per minute; (3) minimum motor capacity in horsepower; (4) maximum horsepower required at tool for different cuts on cast-iron at different cutting speeds; (5) factors for other metals. The bulletin is a perfect mine of information for the machine-shop foreman who uses electric drive, and the series will be an invaluable aid to efficient installation and operation of the electric motor in machine-shop service. The policy of the Reliance Company in publishing this valuable literature is to be commended from every viewpoint.

DATES AHEAD.

New York Electrical Show. Madison Square Garden, New York, October 11-21.

Western Association of Electrical Inspectors. Annual meeting, Detroit, Mich., October 26, 27 and 28.

Illinois State Electric Association. Annual meeting at Alton, Ill., October 26, 27 and 28.

American Electrochemical Society. Next meeting, New York city, October 28-30.

National District Heating Association. First annual meeting, Columbus, Ohio, November 10 and 11.

Alabama Light and Traction Association. Annual convention, Birmingham, Ala., November 15 and 16.

American Association of Electric Motor Manufacturers. Next meeting, St. Louis, Mo., November 15 to 18.

Boston Electrical Show. Mechanics' Building, Boston, November 15-25.

Empire State Gas and Electric Association. Annual convention, New York city, November 17 and 18.

Ohio Society of Mechanical, Electrical and Steam Engineers. Annual meeting, Lima, Ohio, November 19 and 20.

International Independent Telephone Association. Annual convention, Chicago, December 7, 8 and 9.

RECORD OF ELECTRICAL PATENTS.

Issued (United States Patent Office) October 5, 1909.

935,661. RECORDING MECHANISM. John M. Johnson, Ishpeming, Mich. Filed February 21, 1908. Includes an autographic recording mechanism in conjunction with an electric alarm.

935,705. STRAIN-RELIEVING MEANS FOR TERMINALS OF LAMP SOCKETS, ETC. Frederick A. Swan, Cliftondale, Mass. Filed April 15, 1908. The wire is wrapped around a strain-relief screw separate from the binding screw.

935,721. WIRELESS TELEGRAPH SYSTEM. Vincent C. de Ybarrondo, Los Angeles, Cal. Filed January 2, 1909. A central switchboard for a wireless system consists of a mid section in the opposite faces of which are grooves forming seats for the wires, a batten covering the grooves on one of these faces, and a section with binding posts and a switch on the opposite face of the board.

935,733. SOLENOID SWITCH. Arthur W. Berresford, Milwaukee, Wis., assignor to the Cutler-Hammer Manufacturing Company. Filed June 5, 1905. The striking heads carried by the solenoid plunger are adapted to deliver a hammer blow to the blades of knife switches in opening or closing the solenoid switch.

935,746. MASSAGE VIBRATOR. Ernest Fahsbender, Chicago, Ill. Filed April 18, 1907. An electric motor drives a flexible shaft.

935,760. ART OF PHOTOGRAPHY. Joseph J. Johnson, Dayton, Ohio. Filed January 29, 1906. The shutter of a photographic apparatus suspended by a kite line is electromagnetically operated from the ground.

935,763. DRAFT-REGULATING APPARATUS. Cyprien O. Mailloux and Henry J. Westover, New York, N. Y. Filed February 7, 1907. A gas analyzer is electromagnetically operated and controlled.

935,766. EMERGENCY APPARATUS FOR CONTROLLING FLYING MACHINES. James Means, Boston, Mass. Filed Octo-

ber 6, 1908. A motor-control circuit is opened and closed by an automatic self-righting device under the control of the operator for simultaneously changing the positions of the planes.

935,768. ELECTRIC BLOCK-SIGNALING SYSTEM. William F. Meschenmoser, Hoboken, and Cyrus H. Kinsman, Plainfield, N. J., assignors to the Kinsman Block System Company. Filed July 24, 1908. A setting track magnet and a restoring track magnet are placed at opposite ends of a block and shunt circuits are operated by passing cars.

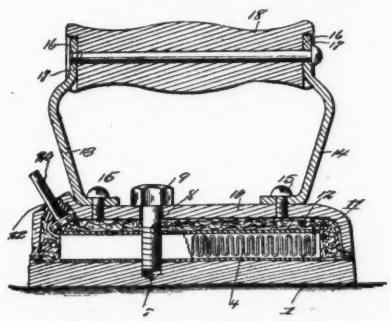
935,792. TELEPHONE RINGER. Nils P. Jensen, Waterloo, Iowa. Filed January 9, 1909. Resilient means in the hollow cores of an electromagnet are adapted to engage independently the adjacent ends of a rocking armature.

935,803. ELECTRIC SIGN. Thomas E. Murray, New York, N. Y. Filed October 24, 1908. Light rays are reflected through openings in a plate.

935,816. ELECTRIC HEATER. William A. Rankin and Willard M. Harwood, Hutchinson, Kan., assignors to Harwood Electric Heating Company, Hutchinson, Kan. Filed October 23, 1908. A plate has on one side an acting face and on the other a series of raised slots containing an insulated high-resistance element or elements of zigzag form.

935,818. MECHANISM FOR ELECTRICALLY OPERATING JACQUARDS WITHOUT PATTERN CARDS. August Regal, Jägerndorf, Austria-Hungary. Filed February 1, 1909. Contacts respectively engage devices which have portions of their faces electro-conductive and other portions non-conductive, and an electromagnetic switch corresponding to each device and its contact controls a branch circuit, etc.

935,838. REVERSIBLE FUSED AND SOLID TERMINAL. Richard H. Conway and Harry E. Bisbing, Philadelphia, Pa., assignors



935,816.—ELECTRIC HEATER.

of one-fourth to Lewis K. Marr, Philadelphia, Pa. Filed November 20, 1908. Two blocks, spaced apart, end to end, have screw threads at their adjacent ends, into which is screwed a plug having fused electric contacts at opposite sides.

935,852. TROLLEY WHEEL. Albert M. Levering, Philadelphia, Pa. Filed October 1, 1908. The central disk of the trolley wheel is pivotally connected to the rim of the wheel.

935,881. SINGLE-PHASE MOTOR. Ernst F. W. Alexanderson, Schenectady, N. Y., assignor to General Electric Company. Filed December 26, 1907. A reactive winding carried in the stator slots is arranged non-inductively to all the other windings and is connected to the exciting winding.

935,892. ELECTRIC SIGNAL FOR RAILWAYS. Augustus C. Carey, Boston, Mass. Filed November 21, 1907. Signaling apparatus and brake mechanisms (and their normally closed circuits) on the respective locomotives are maintained inactive when the locomotives are a predetermined distance apart, and are operated on the approach of two similarly equipped locomotives.

935,895. TROLLEY-WIRE SUPPORT. Royden O. Couch, Charleston, W. Va. Filed March 20, 1909. A clamp is adapted to grip the insulating base block of the support, and to support the trolley wire.

935,896. ARC LAMP. John T. H. Dempster, Schenectady, N. Y., assignor to General Electric Company. Filed May 1, 1905. A core is movable in line with the arcing points of the pair of main electrodes, and an L-shaped member has one end pivoted to this core and the other end normally held by gravity in engagement with the side surface of one of the electrodes.

935,897. MICROPHONE. Carl E. Egnér, Stockholm, and Johan G. Holmström, Saltsjöstorangen, Sweden. Filed March 27, 1908. A sealed casing has one wall formed by the vibrating diaphragm and contains the sound-transmitting mechanism in a hydrogen atmosphere.

935,908. ARC LAMP. Caryl D. Haskins, Schenectady, N. Y., assignor to General Electric Company. Filed February 18, 1907. Electrode material is fed forward to build up the electrode as it is wasted away at the arc.

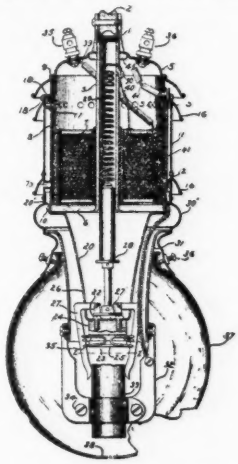
935,915. ELECTRIC SWITCH AND OUTLET BOX. Alpha H. Kling, Detroit, Mich. Filed April 16, 1908. The end plates and other units are furnished with knock-out plugs.

935,920. ARC LAMP. Edwin J. Murphy, Glasgow, Scotland, assignor to General Electric Company. Filed October 26, 1906. An electrode holder is provided with means for engaging an electrode-feeding clutch and holding it against displacement when the electrode is removed.

935,923. CONDENSER. Frank J. Newton, Schenectady, N. Y., assignor to General Electric Company. Filed November 8, 1906. A number of enameled metal plates are rigidly secured by non-conducting clamping devices which pierce them through, and lugs connect alternate plates to an electrical conductor.

935,935. ELECTRIC ANNUNCIATOR. Arthur J. Smith, Bath, Me., assignor to Electric Goods Manufacturing Company. Filed October 29, 1908. A magnet is mounted perpendicularly on a base which has also a drop catch swingingly mounted on it, and a drop moves longitudinally of the base.

935,937. ELECTRIC FURNACE. William A. Smith, Niagara Falls, N. Y., assignor to International Acheson Graphite Com-



935,896.—ARC LAMP.

pany, Niagara Falls, N. Y. Filed June 15, 1909. The furnace chamber has a wall which affords free passage for reaction gases.

935,939. ELECTRIC FURNACE TERMINAL. Eben C. Speiden, Niagara Falls, N. Y., assignor to International Acheson Graphite Company, Niagara Falls, N. Y. Filed June 17, 1909. The terminal comprises a number of graphite members assembled in electrical connection, one or more of these members being divided transversely of the current path.

935,941. ALTERNATING-CURRENT DYNAMO-ELECTRIC MACHINE. Charles P. Steinmetz, Schenectady, N. Y., assignor to General Electric Company. Filed August 13, 1908. The armature has uniform coils of a pitch adapted to prevent induction in the coils of one harmonic of the induced electromotive force and certain of the coils offset with respect to other coils in series with them by an amount adapted to eliminate another harmonic.

936,001. DRY-CELL TESTER. Edwin S. Lincoln, Brookline, Mass. Filed March 6, 1908. The strength of the dry cell is determined by its action on the core of a solenoid.

936,009. TELEPHONE STAND. Evert A. Metcalf, Forbes, Mo. Filed November 11, 1908. A receiver arm is mounted on the transmitter stand.

936,039. ELECTROLYTIC APPARATUS. Isaiah L. Roberts, New York, N. Y. Filed April 3, 1905. Porous diaphragms are made by forming of woody material an article of the desired shape and then partially carbonizing the same throughout to a non-conducting point.

936,055. TROLLEY GUARD. Samuel Stroup, Peru, Ind. Filed August 18, 1908. Guard members secured on opposite sides of the harp have their upper ends bent inwardly over the trolley wheel to retain the latter on the wire.

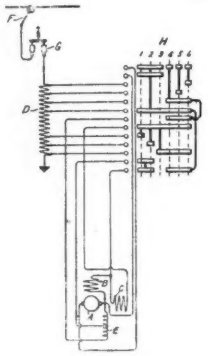
936,067. INCLOSED METER LOOP. Everett C. Wigham, Boston, Mass. Filed April 19, 1909. The meter-loop block has connecting bars with contacts for connection with service, meter and load, incased in insulating material with the poles

of opposite polarity insulated from each other by intervening layers of insulating material.

936,071. MOTOR CONTROL. Ernst F. W. Alexanderson, Schenectady, N. Y., assignor to General Electric Company. Filed December 17, 1907. In combination with an alternating-current motor of the commutator type having inducing and exciting windings on the stator are a reactive coil, and a controlling switch arranged in its starting position to connect the stator windings in series with each other with the reactive coil in shunt to the exciting winding, and in a subsequent position to impress a shunt excitation on the exciting winding and reactive coil in series.

936,074. ELECTRICALLY-OPERATED VALVE. Warren W. Annable, Grand Rapids, Mich., assignor to the Starter Manufacturing Company. Filed April 26, 1909. A magnet has an axial opening through it and a side passage communicating with this opening. The opening is provided with a valve to close it, and an armature moved by the magnet is adapted to open the valve. The passage is also provided with a non-return valve to permit fluid to escape.

936,100. TROLLEY WHEEL AND HARP. Frank L. Eager, Waterbury, Conn. Filed October 3, 1906. The rim of the wheel has a groove including parallel side parts (formed of a single piece) and a bottom sloping but slightly toward the center of the wheel and terminating in a channel having sides steeper than the bottom of the groove.



936,071.—MOTOR CONTROL.

936,116. SAFETY APPLIANCE FOR ELECTRIC ELEVATORS. Clarence S. Gilbert, St. Joseph, Mo. Filed December 28, 1908. Describes an attachment for an electrically-operated elevator to prevent accidental movement of the starting rope.

936,140. TELEGRAPH SYSTEM. William Leivesley, Springsure, Queensland, Australia. Filed August 7, 1906. Includes a switch comprising several divisions, a main circuit connected with two of such divisions, a key and principal relay in this circuit, a second circuit, a repeater and a battery therein, a third circuit controlled by the repeater, a local relay in the second circuit, a circuit controlled by the armature of such local relay, a contact controlled by the relay first mentioned, and means permitting current from the battery to operate the repeater when the contact is closed, such closing operation simultaneously short-circuiting the local relay.

936,156. ADJUSTER FOR ELECTRIC-LIGHT CORDS OR CABLES. Thomas A. Parker, Providence, R. I., assignor to Frank E. Walker and Arthur C. Walker, River Point, R. I. Filed November 12, 1907. A perforated block has a wedge-shaped member for gripping the parts of the cord in grooves in the hole.

936,163. RECEIVING SYSTEM FOR ELECTRICAL OSCILLATIONS. Erich Quäck and Fritz V. D. Woude, Berlin, Germany, assignors to Francis William Pixley and Herbert Allen, London, England. Filed April 27, 1908. Comprises a receiving antenna with a tuned secondary circuit inserted in it, a tuned oscillatory circuit inductively coupled to this circuit, a detector permanently included therein, a capacity, and means for connecting the capacity with the oscillatory circuit and disconnecting it therefrom intermittently.

936,175. PUSH-BUTTON SWITCH. Frank E. Seeley, Bridgeport, Conn., assignor to the Perkins Electric Switch Manufacturing Company. Filed April 21, 1909. The push button is hollow and a visible indicator within it moves with the switch spindle.

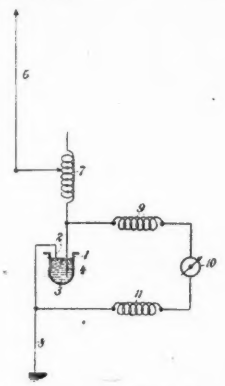
936,207. TELEPHONE TRANSMITTER. Clifford D. Babcock, New York, N. Y., assignor to United Wireless Telegraph Company. Filed April 17, 1909. The transmitter is provided with an element comprising in its composition an oxide of abnormally sensitive conductivity at a certain temperature.

936,208. ELECTRIC BRUSH. Max E. Bacon and Louis J. Meller, Deerfield, Kan. Filed October 19, 1908. The wires of the brush are connected in a certain manner to a source of electric energy.

936,227. ELECTRICAL FUSE. Addison G. Fay, Highland Park, Ill. Filed October 26, 1908. Renewed August 18, 1909. The inner shell contains an explosive and electric wires leading into it, and the outer shell is filled with an asphaltum compound completely enveloping the inner shell.

936,252. METERING PANEL BOARD. Arthur C. McWilliams, Chicago, Ill. Filed October 23, 1907. Has sets of permanent conductor bars running transversely to each other and arranged in two superposed, separated, parallel planes, the bars of one of the sets being arranged in pairs with the two bars of a pair in alinement, the transverse bars being adapted to be electrically connected at their points of intersection and one set of bars running to the meter terminals and the other set to the consumption terminals.

936,254. ATTACHMENT FOR TELEPHONES. Newell B. Parsons, Chicago, Ill., assignor to Belden Manufacturing Company. Continuation of application filed June 22, 1906. This application filed January 6, 1908. Describes an attachment for a telephone-box door.



936,258.—RECEIVER FOR SPACE TELEGRAPHY.

936,258. RECEIVER FOR SPACE TELEGRAPHY. Wilhelm Schloemilch, Oberschöneweide, near Berlin, Germany. Original application filed October 3, 1903. Divided and this application filed January 3, 1906. Includes a receiving conductor, a source of electrical energy comprising an electrochemical cell associated therewith as a wave-responsive device, and a local circuit connected in shunt to the wave-responsive device and including a signal-translating instrument.

PATENTS THAT HAVE EXPIRED.

Following is a list of electrical patents (issued by the United States Patent Office) that expired October 11, 1909:

484,096. GALVANIC BATTERY. John W. Hoffman, Chicago, Ill.

484,120. SECONDARY BATTERY. Wm. L. Silvey, Lima, Ohio.

484,123. ELECRICALLY OPERATED RAILWAY SWITCH. Chas. A Stone, Newton, and Edwin S. Webster, Boston, Mass.

484,140. ELECTRIC FIRE-ALARM. Harvey Cortland, Toronto, Canada.

484,150. MAGNETIC TELEPHONE. Chas. S. Forbes, London, England.

484,182. METHOD OF ELECTRICAL REFRIGERATION. Mark W. Dewey, Syracuse, N. Y.

484,183. ELECTRICAL DEPOSITING METER. Thomas A. Edison, Llewellyn Park, N. J.

484,199. ELECTRIC ARC LAMP. Joel A. Hayes, Carson City, Nev.

484,206. DEVICE FOR PREVENTING ACCIDENTAL CLOSING OF ELECTRIC CIRCUITS IN SIGNAL BOXES. Wm. H. James, Boston, Mass.

484,208. SYSTEM OF ELECTRICAL DISTRIBUTION. Harry W. Leonard, New York, N. Y.

484,232. PORTABLE BURGLAR-ALARM. David D. Nolley, Wilson, N. C.

484,233. COMBINED ELECTRIC BURGLAR AND FIRE-ALARM. David D. Nolley, Wilson, N. C.

484,375. RAILWAY-TRAIN TELEGRAPH. Matthew S. Reiley, Washington, D. C.